U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB 258 157

Proceedings of Conference on Waste Reduction Held at Washington, D.C. on April 2-3, 1975

Environmental Protection Agency, Washington, D C

1975

27

PB 258 157

PROCEEDINGS

1975 conference on

WASTE REDUCTION

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA-SW-7p	2.	3. Recipient's Accession No. PB-258 167

4. Title and Subtitle
Proceedings of Conference on Waste Reduction Held at Washington, D.C. on April 2-3, 1975

5. Report Date
1975

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Environmental Protection Agency
Washington, D.C.
Office of Solid Waste Management Programs

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstracts

The report documents a 1975 conference of government, industry, labor, and public interest groups on means of conserving resources and protecting the national environment by reducing the production of wastes. Included were discussions of regulations, innovations, sources, design engineering, recycling, and related topics.

17. Key Words and Document Analysis. 17a. Descriptors

*Industrial wastes,
*Management planning,
*Meetings,

Reduction,
Utilization,
Materials recovery,
Packaging,
Containers,
Sources,
Systems engineering,
Technology innovation,
Design criteria,
Legislation,
Regulations,
Environmental impacts,
Solid waste disposal,
Project planning.

17b. Identifiers/Open-Ended Terms

Waste recycling,
Solid waste management.

17c. COSATI Field/Group 13 B

18. Availability Statement
National Technical Information Service
Springfield, Virginia 22161

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page)
UNCLASSIFIED

21. No. of Pages
161p

22. Price
6.75/3.00

PROCEEDINGS

1975 Conference on

WASTE REDUCTION

April 2-3, 1975
Washington, D.C.

This publication (SW-7p) was prepared by the staff
of the OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS

U.S. Environmental Protection Agency
1975

An environmental protection publication (SW-7p)
in the solid waste management series

Foreword

Waste reduction, defined as prevention of waste at its sources through change in the design of products or in the ways products are used, was the subject of a conference sponsored by the U.S. Environmental Protection Agency on April 2-3, 1975, in Washington, D.C.

For our society, geared to intensive consumption of resources, establishment of waste reduction as a basic goal would require major shifts in attitudes, industrial practices, and consumer behavior. The wide-ranging implications were apparent in the interests represented by the approximately 200 persons attending the Conference on Waste Reduction—industries, citizen and public interest groups, labor unions, government at all levels, research and development organizations, consumers, universities, and environmentalists. As might be expected, the conference was characterized by keen interest, controversy, and variety in the facts presented and their interpretation.

The first day of the conference was devoted to exploration of the policies and views of government, industry, labor, and public interest groups. On the second day, the technical means of implementing waste reduction were discussed, with special attention given to mandatory deposits on beverage containers. This publication includes all 28 presentations but not the informal discussions. Except where editorial changes seemed necessary for clarity or format, the original language of the papers has been retained; the opinions expressed are those of the speakers and not necessarily those of EPA.

The Solid Waste Disposal Act as amended requires EPA to study and investigate "changes in current product characteristics and production and packaging practices which would reduce the amount of solid waste." The Act also authorizes the collection and publication of this information. By sponsoring the Conference on Waste Reduction and publishing these proceedings, we hope to further the exploration, discussion, and understanding of this increasingly important subject.

—SHELDON MEYERS
Deputy Assistant Administrator
for Solid Waste Management

CONFERENCE CHAIRPERSONS

Conference Chairman:
H. Lanier Hickman, Jr., U.S. Environmental Protection Agency

Session on Government Perspectives:
Hazel Henderson, Public Interest Economics Center

Session on Industry and Labor Perspectives:
Eileen Claussen, U.S. Environmental Protection Agency

Session on Public Perspectives:
Toby Page, Resources for the Future

Session on Technical Options:
Howard Marder, *Modern Packaging*

Session on Beverage Container Legislation:
Kay Stouffer, National Association of Counties

Contents

Page

INTRODUCTION 1
Roger Strelow, U.S. Environmental Protection Agency

GOVERNMENT PERSPECTIVES

View from EPA 5
Arsen J. Darnay, U.S. Environmental Protection Agency
Energy Conservation and Source Reduction 9
Morris Zusman, Federal Energy Administration
Senate Commerce Committee Plans to Encourage Materials Conservation 13
Linda A. McCorkle, Senate Commerce Committee
Observations of a Senate Staffer 18
Richard Hellman, Senate Public Works Committee
The Need for Action Grows 21
John R. Quarles, Jr., U.S. Environmental Protection Agency

INDUSTRY AND LABOR PERSPECTIVES

Innovation Versus Regulation: Industry View 27
William Sahl, Glass Container Manufacturers Institute
A Food Industry Perspective 32
David James, General Foods
Concerns of Labor 36
George H. R. Taylor, AFL-CIO
Environmental Protection and Productivity 41
James R. Peterson, The Pillsbury Company
Retreading and the 100,000-Mile Tire 46
W. James Sears, Rubber Manufacturers Association

PUBLIC PERSPECTIVES

Views of a Consumer 50
Arthur H. Purcell, George Washington University
Source Reduction: An Important Part of a Materials Policy 54
Pat Taylor, Environmental Action, Inc.

In the District of Columbia 59
William C. McKinney, Department of Environmental Services, District of Columbia
View of the League of Women Voters 63
Dana Duxbury, League of Women Voters
Approaches to Source Reduction 66
Karen A. Wendt, Minnesota Pollution Control Agency

TECHNICAL OPTIONS

Some Basic Choices 74
William E. Franklin, Franklin Associates, Ltd.
Packaging Systems Requirements 78
Howard Cannon, Continental Can Company
Waste Management through Product Design: The Case of Automobile Tires 83
Robert R. Westerman, California State University
Contemporary Dairy Packaging: Consumer Appeal and Conservation 90
Charles D. Russell, International Paper Company
Fast Food Packaging and Waste Reduction 100
Norman D. Axelrad, McDonald's Corporation
'Bring 'Em Back, Repack and Save' 108
Alan E. Greene, Red Owl Stores
For a Total Systems Approach 113
Kenneth G. Van Tine, Owens-Illinois, Inc.
Industry's Commitment to Waste Reduction 119
Eric A. Walter, Aluminum Company of America

BEVERAGE CONTAINER LEGISLATION

The Referendum in Dade County 124
Harvey Ruvin, Dade County Commissioner
A More Positive Strategy 129
Henry B. King, United States Brewers Association, Inc.
Effects of Reuse and Recycling of Beverage Containers 136
John H. Skinner, U.S. Environmental Protection Agency
A Labor Viewpoint 142
Robert Steffaden, AFL-CIO

REGISTRATION LIST 145

Introduction

Roger Strelow*

I would like to welcome all of you very heartily to this 1975 Waste Reduction Conference. In some ways this is a first as far as I know, the first major conference held on this subject exclusively; the first one devoted to waste reduction, or source reduction, as it is sometimes known. Most conferences dealing with waste management or recycling touch on this subject to some degree, but an issue as important as this one certainly deserves the time that obviously, by your attendance, you plan to give it today and tomorrow. The turnout is certainly encouraging. I think it exemplifies the kind of importance, and certainly the widespread interest, that this subject carries. It is very much on people's minds today. I am also very gratified in looking over the program that we have a number of well qualified participants. I think it is important that we have a good cross-section; a representation of a variety of viewpoints from industry, labor, consumers, and different areas of government.

It's not surprising that we do have the kind of interest that exists today on the subject of wastefulness. In the past, we rather assumed that questions relating to eventual serious resource shortages would work themselves out through the laws of supply and demand and through technological developments, and we didn't have to worry about them. But I think for a variety of reasons, including the fact that the economic system doesn't work all that ideally, in terms of supply and demand interactions in an ideal Adam Smith type of free market, we do have to worry about them consciously. We do have to do some very careful and thoughtful planning. We can't simply leave it to the forces that be to sort out our problems. I think the energy crisis that we're now in, and are going to be in for some time no matter what we do in the very near term, illustrates that well. It is shown by a variety of factors, only one of which is the power of the OPEC nations and the kinds of perturbations that they can create just with a meeting like this, in one day's time, by a decision about their prices. It is certainly clear that we cannot be complacent about our very serious resource questions.

Much of the interest in waste reduction, at least from my own perspective, is traceable to a concern with the increasing proliferation and complication of packaging materials. People began to realize many of our consumer products are being incredibly overpackaged. This made people begin to think, and fortunately I think this has led to much more fundamental concerns, even though that in itself is an important one. The interest in packaging was stimulated when people realized that the rates of solid waste generation were far outstripping the capacity of our municipal systems to handle the waste. Indeed, I remember this was pointed out very vividly in an article in *Fortune* magazine a number of years ago dealing with waste generation in our society. I recall my impression at the time was that the incredible rate of per capita waste generation, not only its increase in this country, but also in comparison with that of other societies in the world, was just downright embarrassing. To think that our society could have a value system and an economic system that would involve such incredible consumption and throwaway of wastes.

---

*Assistant Administrator for Air and Waste Management, U.S. Environmental Protection Agency.

These kinds of concerns, as the more serious implications were realized, gave rise to questions: shouldn't we be doing something about it? Not just what to do with the wastes we have, not just accepting as inevitable these spiraling rates of waste generation, but can't we do something to affect it at the source? Can't we slow down the volume of the waste stream? Certainly we are in an age where this total perspective of pollution control makes a lot of sense. One of the lessons in the pollution control business is that you ought to deal with pollution at its source, rather than try to clean up later. Wherever you can simply reduce the amount of pollution to be generated, the raw waste load going into the waters, or whatever, that is preferable from a variety of standpoints.

The Congress recognized this concept in the 1970 Resource Recovery Act. Among other things that act required EPA to investigate and study means of reducing the generation of waste at the source. A number of studies and analyses have been conducted; obviously a lot more remains to be done. EPA can't and shouldn't do all of it. That's really what this conference is about. Others will get into much more sophisticated detailing of some of the issues involved as the conference goes along, but let me briefly mention a few that come to my mind in thinking about the subject.

First, clearly waste reduction is a significant departure from the conventional way of seeing things in the waste management field. It is not a subject that can be approached with conventional perspectives and viewpoints. It really requires a whole new mode of thinking, and we all have to be willing to stretch our minds a bit and try to approach it with a creative, constructive, and thoughtful perspective. The waste explosion imposes responsibilities on all sectors, public and private, as well as individual citizens. It's not a problem that's going to be solved by any one type of activity alone. Exploration of the various roles and responsibilities of different elements of society is needed. What is reasonable to expect? Where will the costs fall under different options for dealing with the problem? Who logically ought to bear the costs that will be involved in making whatever changes may be ultimately desirable? These are issues that we need to face.

Second, there are really two types of waste reduction action that we can contemplate in very generalized terms. One type can and will take place, perhaps naturally, as a result of economic conditions. We are seeing some of this already. In the energy field there is already increasing incentive for major industries to curtail wasteful use of energy. It had simply not occurred to people, and if it had, it was not particularly important to them in an economic sense before. I think we are also seeing this to some extent in decisions about packaging and other matters. So there are natural economic forces that will come to bear. Their effect has to be seen in perspective and in conjunction with the second type of action, which is taken as a matter of conscious social decision. One of the issues raised, then, is where can we and should we rely on certain market forces that exist or can be expected to exist and where, on the other hand, should we rely on legislative mechanisms and conscious policy decisions in Congress and elsewhere?

A third issue, touched on before, is that when we make conscious public policy decisions and impose them on the marketplace and on society generally, there are always some costs involved. Some of the key questions that we must address, and that EPA is certainly very concerned with, are: Where would these costs fall under different options? Who would bear them? Who should bear them? I hope one of the messages that will be conveyed clearly in this conference is that, although we approach the subject from an environmental standpoint because of our agency's mission, we are not by any means unmindful of the other ramifications of a topic and a goal such as waste reduction. In this day and age it is true in all of our programs that EPA must take a comprehensive view and not be narrowminded or single-minded in its objectives. We do want to see the total spectrum of interests involved, and the ramifications on the economy, social patterns, and energy consumption.

The fourth point is that waste reduction means saving resources for the future. However, it's particularly difficult to quantify or to cost out the benefits that will be realized in the future. Our ability to predict and project virgin resource availability is very important, but in many cases our predictions are just stabs in the dark. To some degree, as in other activities of the agency, many times we shall simply have to act out of a reasonable prudence, rather than on the basis of precise quantification of the benefits. We have to be careful and analytical of where we think certain risks lie, including the risks of not taking some action; many times, frankly, we take an action in order to avoid the risk of some uncertain magnitude.

The fifth point is that, as we fully recognize and I know many of you do, the subject of waste reduction is a very complex one. We need to proceed deliberately and carefully, but this does not mean slowly. There are things we can and should be doing in the very near term. But I think all who are familiar with this subject realize that we must proceed with great care. We want to make sure that the concept does not get a bad name by virtue of some precipitous action which turns out to have side-effects or nonenvironmental ramifications that we had not foreseen or others had not foreseen. There could obviously be a negative reaction to the concept if we did proceed in that manner, so we want to be careful. There are a lot of tradeoffs involved. One interesting example came up in a discussion we were having the other day on the nonreturnable bottle issue. One option that I raised for consideration, obviously with some facetiousness, stemmed from my visit a couple of years ago to the Soviet Union. At that time I was part of an environmental delegation on water pollution issues. One of the many fascinating things to observe about the way things are done in the Soviet Union is that their vending machines, or at least the ones we saw, did not have either bottles or cans or paper cups. They had plastic cups attached to the machine by a small chain. You put your kopek in the machine, placed your cup under there, had your drink, and went on your way. This is an obvious example of a scheme that could have some real source reduction benefits but possibly some other "disbenefits."

I know this will be an important and useful conference. It is an important issue. I think we stand to learn and gain a great deal of insight from many of you today, and I want to extend again my personal appreciation for your participation, interest, and helpfulness to us.

Government Perspectives

VIEW FROM EPA

Arsen J. Darnay[*]

I guess the $64 question is: What are government perspectives on waste reduction? Because when we talk about government, we are talking about State and local governments and the Federal Government, and within the Federal Government, its branches. And, as this issue continues to advance, we are finding that the courts are more and more involved in making final decisions on what is and what is not to be the government's role in waste reduction, or source reduction, as we used to call it.

In terms of history, I recall very well the beginnings of the waste reduction issue, at least in the Federal Government. At one time the Midwest Research Institute had a Washington representative by the name of Peter Shoup, who went around talking to new and fledgling agencies, among which was the Bureau of Solid Waste Management. He regularly went to see those people to find out what they were doing. One day his wife bought a paper dress. You will probably have forgotten that at one time there was to be a big industry built around the paper dress. But he saw this paper dress, and it triggered an idea in his mind, "My God, what will happen with all the underwear, all the shirts, and all the socks when everything will be disposable?" So he went to the Bureau and said, "Hey, fellows, what about looking at disposables and what this will do to your program in the future?" The answer came back from the Bureau, "Curious that you should have been thinking about that because we have been thinking about packaging. Why don't you guys make a proposal to look at packaging, and we'd like to have a report that has all the facts and numbers. We have an image of a report that has lots and lots of tables."

I turned out to be the unfortunate guy who did the report and made all those tables with one or two associates, one of whom will later appear and comment on it for himself. With the beginning of concern about packaging, waste reduction became an established issue, and suddenly more and more people began to think about it. I'm not suggesting that this whole issue was generated by that paper dress, but I am suggesting that Federal activity had something to do with it.

---

[*] At the time of the conference, Mr. Darnay was Deputy Assistant Administrator for Solid Waste Management, U.S. Environmental Protection Agency; he has since left that post to join the Carborundum Company.

Rapidly the issue became focused around beverage containers. I've been involved in that issue since 1969 when, as a result of a speechwriter's action in the White House, I think the first or second environmental report of President Nixon's called for an investigation of a mandatory ban or some such thing. In the wake of that presidential announcement, a staff was pulled together to look at what had been said in order to put together what might be a reasonable program on the issue. I remember working very hard on that and looking at all the options that continue to be discussed today.

Today in the area of State legislation, with the exception of Minnesota, waste reduction at the government level continues to be an issue of the bottle and the can. The uniqueness of this topic, of course, is that in the case of beverage containers, there is a ready alternative to the one-way system, which is the existing returnable system. I think one of the reasons why waste reduction has focused on beverage containers is because there is an existing returnable system as compared to a one-way system. Once you get away from the returnable beverage container, the waste reduction issue becomes much more difficult—difficult to deal with conceptually as well as in practical terms.

Before I get into some of those options that are open to government at all levels, let me try to say where I think it stands right now. We have two States and one or two communities with beverage container legislation. We have the State of Minnesota which has a wider authority on packaging. At the Federal level, it is primarily the EPA that has the authority to study the issue and report to Congress what it finds. The studies that we have carried out to date have focused primarily on packaging and on beverage containers. Obviously as long as we have the authority we are going to continue to take a look at other options as they come up. Congress has taken a considerable amount of interest in this topic, and we are now at the stage where Federal legislation pending on solid waste may or may not contain provisions for waste-reduction-type measures, either regulatory or otherwise. But it's very much an open kind of thing as to what will really happen. It's one thing to say that we at EPA fully believe and support this concept, believe we are in it for the long run, and think that we're going to dig in and do the job no matter what the pressures may be. It's another thing to say that the Federal Government has made a decision on it in the sense of having passed a law to require something to be done, something other than looking at it and analyzing it.

So the situation is very much in the balance. A large number of States are looking at beverage containers. If a number of them do pass laws, I think there may be a stampede in this direction. If a large number of them are defeated, there is going to be no stampede. I don't know which way it's going to go, frankly.

When you look at waste reduction approaches from the government's perspective, you really see four major options. If you are looking at widespread waste reduction approaches, which involve a large number of products, it seems to me the only feasible method is taxation. You have to impose a tax so as to influence the choice of materials and the quantity of materials that are chosen and purchased. If the tax is placed at the point where the industrial user buys it rather than where the consumer buys it, it is likely to be more effective. Short of that, administrative mechanisms that attempt to regulate packaging as a whole are meaningless because packaging is not a thing you can grasp. It is many, many little things, each of them very complex.

As the alternative to mass approaches, which probably calls for fiscal approaches, is specific regulation of individual objects and items. Now the beverage container issue is an example of what you get into when you look at individual package regulation. It seems like such a simple thing when cans and bottles are associated with beer and soft drinks, but when you get into the topic, you find that it's an extremely complex distribution system. If regulatory approaches are taken, then it means basically that items have to be studied one by one, and decisions have to be reached one by one. That is a slow process.

The third basic approach is to reach voluntary agreement with industry or groups of industries. This is a common approach in Europe where there are no antitrust laws, where an industry association really can stand for and represent the whole industry, where deals can be made, and agreements and contracts can be signed between government and industry. In this country the voluntary approach is much more difficult to achieve.

The fourth option is voluntary action by the consumer. This means simply that the consumer knows enough to make the right kind of product choices in the marketplace, and the consumer chooses the product that has less material or consumes less energy, or consumes less energy in the making.

Obviously at EPA we are looking at all these options. We are looking at mass-effect type of legislation, the most common example being the penny-a-pound type of concept. We are looking at specific regulations oriented toward individual product lines. We are exploring voluntary approaches with industries or individual corporations. Obviously we are also engaged in publicizing what we know about products, so the consumer can make the choices.

One major problem I think the government faces in this area, which has already been alluded to and will be heard about further, is that in waste reduction approaches, particularly where they are nonvoluntary and where they are an intrusion into the virgin sanctuary of free enterprise, there is always a cost. And who is to bear that cost? I am always reminded of the difference with which the British and the Americans handled the issue of slavery. When the British decided to do away with slavery in 1830 or thereabouts, they compensated the owners of the slaves and as a consequence they did not have a major civil war. In the United States the approach was different. The slaves were simply declared free as they had always been in terms of nature. But those who owned those people, of course, were expropriated of what they considered to be their property, and as a consequence we had a major war. This, of course, simplifies history; nevertheless, it helps me to visualize the reactions of an industry, such as the beverage container industry, or a special group of skilled workers in an industry to having taken away from them arbitrarily (it would seem to them because there had been no early warning) an economic capability which they considered to be their own. And this brings to the fore the question of what we should do: How would you implement such laws responsibly at the national level? Very little discussion has been held about the question of compensation, and I think that that is a worthwhile question to consider. There are transition costs—who is to bear them?

Now we at EPA have begun to look at some of these issues. The agency has a mandate to look at waste reduction approaches, and in doing so we find that if they can be implemented, they are better than resource recovery, they are better than environmental control of land disposal or of burning. They are the best and simplest way to conserve resources. They can be achieved over and above any connection with recycling. They represent a very major and promising response to the problems of waste.

How to implement: that's a problem. How soon to implement: that's another problem. Where to implement: that's a third problem. But that we should act is clear to us, certainly on the basis of what we have been able to learn. And that we are going to continue to press for action is also clear.

ENERGY CONSERVATION AND SOURCE REDUCTION

Morris Fuchman*

Five years ago this month the Nation celebrated the first Earth Day. Since then, protection of the environment has assumed its rightful place as a major public issue. Only a little more than a year ago the Arab oil embargo raised the issue of energy to similar status as a focus of major public interest and concern.

Some people now tend to view energy and environmental interests as mutually antagonistic, and insist that environmental concerns must give way to allow greater exploitation of energy resources. And it is true that in the interest of energy independence it may be necessary to revise some of the timetables for achieving certain environmental goals.

But, in the long run, and viewed from a larger perspective, energy and environmental interests are remarkably consistent—particularly in the area of conservation. Although energy and environmental issues were recognized by the public at different times, and under radically different circumstances, I think we must all begin to realize that they are actually part of a whole. Pollution, energy shortage, and a developing scarcity of certain metals and other materials are all related to our high-energy, high-consumption lifestyle.

EPA often makes the point that Americans generate more solid waste per capita than do citizens of any other country. By the same token, we at Federal Energy Administration often note that Americans use six times as much energy on a per capita basis as the average for the rest of the world.

During the past 10 years America's appetite for energy has increased nearly 5 percent per year, far faster than our population. At this rate our need for energy supply would double in about 15 years. Reducing the growth rate to a 3 percent rate would mean doubling in 24 years; a 1.5-percent rate would mean doubling in 50 years; and a 1 percent growth rate would mean doubling in 72 years. The implications of having to double our supply in 15 years as opposed to 50 years (or 72 years) are obvious.

WHY WE MUST GAIN TIME TO RESTORE BALANCE

At a time when we have to look to other nations for energy supplies that are becoming increasingly more expensive, it is absolutely essential that we curb runaway growth if we are to remain a strong industrial nation. We must gain significant time to restore balance between energy supply, which is shrinking, and energy demand, which is growing.

---

*Office of Energy Conservation and Environment, Federal Energy Administration.

We must have that half-century to permit a rational reduction in oil imports.

We must have that half-century to eliminate the driving force of our current inflation, for the almost fivefold increase in world oil prices in recent years is one of the main contributors to inflation.

We must have that half-century to clean up the environment and devise ways to keep it clean.

We must have that half-century to develop significant new technology in energy sources, transmission, storage, and use. It takes 20 years on the average to develop technology such as nuclear fission or solar energy. It will be 10 years since the Trans-Alaska Pipeline was first proposed before we bring any oil out of Prudhoe Bay. It will also take a decade to bring in new fields on the outer continental shelf. It normally takes 8 to 10 years for a new powerplant and 5 years or more to start up a new coal mine or a new refinery. Each of these is only an optimum estimate. If siting difficulties are encountered, the time is much longer.

Whether you agree with me that we should have 50 years, or whether the optimum is 30, 35, or some other period, there can be no disagreement that achieving energy self-sufficiency will take time. The most immediate, the most pressing, way for us to bring energy demand and domestic energy supply into any sort of reasonable balance is through a strong, decisive energy conservation program. That is the only way we can buy the time we must have.

Obviously one sure way to conserve energy is to reduce the per capita generation of solid waste--to recycle, to reuse, and to reduce waste at the source. It seems almost automatic that as solid waste systems are developed that incorporate these conservation technologies, energy will also be saved in some more or less direct proportion to the amount of materials that are saved. For example, a ton of primary aluminum takes nearly 170 million Btu to produce; a ton of primary copper takes nearly 110 million Btu; a ton of glass containers takes about 15 million Btu; and a ton of newsprint nearly 22 million Btu.

By discarding these materials as waste, or by using them in careless and even frivolous ways, such as in overpackaging, we must recognize that we are wasting the energy required for their extraction and manufacture, as well as the material resources they represent.

On the other hand, by reducing the amount of energy we use, to that degree the adverse impact of energy production on the environment will be reduced. The less fossil fuel burned, whether petroleum or coal, the less air pollution; the less chance for oil spills; the fewer sludges generated; and the less land disrupted by the coal mining process.

THE ECONOMIC IMPACT OF REDUCED CONSUMPTION

You might ask, can we afford to reduce our energy consumption growth rate to the range of 1 to 2 percent per annum, or would our standard of living suffer as a consequence?

Essentially, the same question may be raised regarding levels of consumption of a kind that notoriously contributes to high waste volumes such as packaging wastes and short-lived goods. This question must be considered by EPA. However, in the case of energy it is a fact that the nations with the lowest standard of living are those with the lowest energy consumption per capita, nations such as India, Pakistan, South Vietnam, and Thailand. The nations with the highest standards of living are those with the highest per capita consumption. One might conclude from these observations that economic growth and energy growth are inseparable— that economic growth cannot occur without energy growth. As we dig deeper, however, this conclusion becomes less obvious.

Four nations with per capita incomes comparable to ours consume less than half as much total energy per capita. In millions of Btu, our consumption is 330 million per capita; Sweden's is 161 million; Denmark's 141 million; West Germany's 154 million; and Switzerland's 90 million. These figures are surprisingly low and suggest that energy growth may not necessarily be a prerequisite for economic growth.

Let's look deeper into the economic impact of reduced consumption. Just as "a dollar saved is a dollar earned," a barrel of oil saved is better than a barrel of oil produced. To name one benefit, it is easier and cheaper to keep the environment clean by not producing and consuming the energy resource than to have to clean up after burning it in the atmosphere. That's one compelling reason why conservation becomes such an attractive alternative; saving on energy demand may not even require massive changes in our lifestyles. The only changes could be those that improve the quality of life. It may not make any difference, for example, to a person wishing to increase the use of his car by 4,000 miles a year in 1980 over 1975 how he or she does it. One could provide that the motorist has, say, 40 percent more fuel available, or one could assure him that his car would get the equivalent in better mileage. (Someone has said that a fish in a boat that has sprung a leak does not care whether you continue to put water in at the top as fast as it runs out, or plug the hole; the results are the same.)

I'd like at this point to indicate some of the specific areas relating to solid waste that FEA is pursuing.

Through the efforts of the Administration, the three major auto manufacturers have committed themselves to achieving a 40 percent improvement in new car fuel economy within a 5-year development period. This 40 percent improvement in average miles per gallon of the 1980 new car fleet is measured against the average fuel economy of 1974 models.

In order to achieve these efficiencies auto manufacturers will have to utilize two techniques that will result in less solid waste—namely, radial tires, a longer lived product, and less packaging material, lighter automobiles. The New York Times reports that the 1977 standard Chevrolet having the same interior dimensions as the 1975 Chevrolet Impala will weigh 1,000 pounds less.

Through our industrial energy conservation programs, we are working with industry to find ways to improve the thermal efficiencies of their process. This includes utilizing scrap material to the greatest extent possible.

We are making broad strides in developing policies and educational programs that will encourage the productive utilization of waste oil.

Similarly, there is an active program to identify and overcome the barriers to productively utilizing the latent energy in the solid waste stream.

Rather than closing on a list of specific activities relating to solid waste that are currently underway in the Office of Energy Conservation and Environment, I would like to leave you with the fact that source reduction is a fundamental theme in developing a national conservation ethic; it is imperative that we develop such an ethic.

The need for this conservation effort is all too obvious when we consider that the Arab embargo of 1973 resulted in a significant drop in our gross national product and the unemployment of perhaps one-half million people of our labor force. Yet today, even more of our imports are coming from Africa and the Middle East than a year ago. Now over half of our petroleum imports come from sources outside of the Western Hemisphere. And, unless we do something, this dependence on African and Middle Eastern sources will continue to grow. By 1977 imports will reach 8 million barrels per day, as compared with 6 million during the last embargo. Because all of the increase will come from insecure sources, we may well be just as vulnerable as we were last winter. Further, without conservation, our tab for imported oil, which was $3 billion in 1970, and $24 billion last year (1974), would reach $32 billion in 1977. This is simply unacceptable. In the immediate future, there is only one thing we can do, and that is to launch a rigorous, sustained, and all-encompassing energy conservation program.

The time to start is now.

SENATE COMMERCE COMMITTEE PLANS TO ENCOURAGE MATERIALS CONSERVATION

Linda A. McCorkle*

It is a pleasure to meet here this morning with you to discuss the plans of the Senate Commerce Committee in the areas of materials conservation and waste reduction.

The Senate Commerce Committee recognizes that we are no longer a resource-rich country. During the oil embargo and related energy shortages, the Nation became aware, brutally aware in the case of energy, of our international dependence on foreign sources for a variety of critical natural resources. This increased recognition should help us to move away from our throwaway mentality, which is characterized by conspicuous consumption, to a vitally needed ethic of conservation. The Commerce Committee embraces the conservation ethic. The committee also recognizes that the efficient use of materials and energy at all stages of the materials cycle and the reduction of waste at all stages of the materials cycle—including extraction, processing, design, use, and disposal—are essential components of a legislative strategy to meet the goals of the conservation ethic.

I am not here to build the case for materials conservation. We are all too familiar with the facts: over 135 million tons of solid waste are generated annually by this country; U.S. consumption of materials is far above that of the rest of the world—we represent only 7 percent of the world's population but consume 30 to 40 percent of the world's resources; government practices and policies continue to provide disincentives for recycling and reuse; and Interior Department figures indicate that the United States is dependent on imports for over half of its supply of six selected basic raw materials—bauxite, chromium, rubber, tin, nickel, and zinc. But despite these facts we are not moving expeditiously. Recycling, as just one part of a comprehensive materials conservation approach, is an environmental necessity and akin to motherhood but, unlike energy conservation, is not yet an economic necessity. Many of the externalities of waste and demand by future generations are not included in the current prices for virgin natural resources. Whether or not the Congress does move on legislation to change this situation remains to be seen, but despite how neo-Malthusians and cornucopians come out on the question of the ultimate exhaustion of our natural resources, the clear fact is that price fluctuations for essential resources and materials will continue and become increasingly severe in the future if the materials conservation ethic is not incorporated into government and industry policies and priorities. This scenario can only increase our vulnerability to shortages and other severe market dislocations in the future.

---

*Staff Counsel, Senate Commerce Committee.

PLANS OF THE SENATE COMMERCE COMMITTEE

The Senate Commerce Committee is working on a number of items in the 95th Congress which will meet the need for incorporating the conservation ethic into government and industry policies. The work of the full committee in the areas of energy, materials, environment, and technology is being closely coordinated this Congress due to the obvious overlaps in policy development. I will briefly list the parts of the Congressional Energy Program which the Commerce Committee is addressing but will focus the remainder of my remarks on general materials conservation initiatives. The energy initiatives include: (1) natural gas legislation to improve the supply situation while controlling prices; (2) automobile fuel economy standards; (3) industrial energy conservation to stimulate energy conservation in U.S. industry through a program with specific conservation goals for industrial efficiency; (4) truth in energy; (5) reform of the electric utility rate structure to eliminate waste and promotional rates. In addition to energy conservation initiatives, the Senate Commerce Committee will consider specific legislation for materials conservation in order to prevent other resource problems from ever reaching the crisis proportions of our energy situation. Briefly, and I will discuss each of these items in greater detail, the materials conservation suggestions the committee has under consideration include: (1) materials conservation and recycling incentives to package left over from last year's recycling bill which includes the authority for issuing product standards; (2) nonreturnable container legislation; (3) materials research and development; (4) materials information system.

Materials Conservation And Recycling Incentives

General. In the 94th Congress, the Senate Commerce Committee reported S. 3951, the Resource Conservation and Energy Recovery Act of 1976. It was a comprehensive bill for materials conservation which was compiled after receiving testimony from 57 witnesses during 11 days of hearings. S. 3951 was then referred to the Senate Public Works Committee. I am told that Public Works will be moving in the near future on its comprehensive legislation for recycling through amendments to the Solid Waste Disposal Act. Staffs of both committees are working together.

In order to avoid the necessity for re-referral, members of the Commerce Committee will probably attempt to move simultaneously with the Public Works effort but only on matters within Commerce Committee jurisdiction. These matters include: the discriminatory impact and reasonableness of freight rates for recycled materials; labeling policies of the Federal Trade Commission which discriminate against recycled oil; government procurement policies for recycled materials; research and development demonstration projects for new energy and resource recovery technology (but only to the extent members of Commerce feel Public Works does not adequately cover this); the establishment of a National Commission on Environmental Costs to study the feasibility of utilizing charges to internalize the costs of depleting natural resources; and product standards to reduce solid waste, to conserve critical materials, and to protect human health and the environment.

Product Standards. Let me briefly outline the current staff approach to product standards. The Commerce Committee is committed to the conservation of materials and energy and to waste reduction at the source. As far as the specifics of source reduction are concerned, however, it is not entirely clear what is the best and most appropriate way to proceed. Many here today are familiar with section 7 of last year's S. 1086, which authorized the promulgation of product standards by EPA for the control of waste. Although it was reported by the committee, that language was attacked later as being too broad a grant of discretionary power. The philosophy behind section 7 has been endorsed by the full committee during the last Congress. It is not clear, however, that EPA can administer the section as it was reported. Consequently, it is being redrafted to meet the valid objection of overbreadth. If EPA has any hope of administering a product standards program, the criteria for identifying products for which standards should be developed must be specific and the method for developing appropriate standards for these identified products also must be specific. Technically, it is very difficult to measure the materials and energy savings of alternate standards; in many cases, information on the economic consequences of alternate standards is also deficient. Requiring EPA to work closely with an agency experienced in developing standards and measuring materials properties, such as the National Bureau of Standards, would perhaps help alleviate some of these technical problems. In some cases, it may be determined that more basic research on the properties of materials and savings from alternate processing techniques is needed before tying up the agency in litigation for failing to promulgate standards. The product standards program must be handled thoughtfully in order to assure its effectiveness in meeting conservation and efficiency objectives. Classes of products can be identified based upon the amount of material contributed to the solid waste stream, the potential such products offer for reducing the use of critical and essential materials in short supply, or the unreasonable hazard to human health and the environment associated with the manufacture, distribution, and disposal of such products. The committee is interested in promoting a market for recycled, reusable, durable, and biodegradable products. More Senators are open to the concept of achieving this through product standards. With your suggestions, we can move on reporting such a section this year.

Bottle Bill. Senator Hatfield's bill, S. 613, requiring a 5-cent refundable deposit on all beer and soda containers is before the Senate Commerce Committee again this Congress. The bottle bill in Oregon was originally enacted as an anti-litter law, but is now promoted as an energy and materials saving device as well. As you know, the debate on the relative merits of this proposal is hot and heavy. The committee intention at this time is to consider this proposal in conjunction with its other materials conservation and waste reduction initiatives. The Commerce Committee will first solicit comments on the bill and then decide whether or not additional hearings are necessary this year because of the extensive hearing record developed last year on the nonreturnable beverage container issue. At this time, tentative plans do not include additional hearings on the bill. The committee, however, is extremely interested in developing this legislation properly. The bill represents an honest effort to reduce waste through a national program. The bottle is symbolic of our throwaway mentality and the need for a national commitment to conservation. The committee will carefully consider the competing claims of the proponents and opponents of the bill, including the energy and materials savings from a shift to a returnable system; the investment requirements for a shift to a returnable system; the economic impact of the bill on industries producing the beverage containers; the economic impact of the bill on labor--both employment opportunities in the long-term and short-term employment dislocation--an especially sensitive issue while our economy is in a recession; and the economic impact of the bill on the final price to consumers. Last year officials from both FEA and the EPA supported the bill. Of course, administration support will be important if the committee favorably reports the bill.

Materials Research and Development

Additionally, the Senate Commerce Committee will continue its work in this Congress on a proposal for a materials research and development program which harnesses technological opportunities throughout all levels of the materials cycle to avoid future shortages of products and materials. The committee supports approaches to materials conservation which capitalize on technology. A materials research and development program which promotes the development of substitute materials and processes, increases recycling opportunities, increases the potential for saving on our annual corrosion loss of over $10 billion, and encourages the design of products for a longer life and more efficient use is an important part of a materials conservation program.

Materials Information System

Another major legislative initiative in the materials area is the establishment of a materials information system. The Commerce Committee held hearings last year on legislation to improve the current information systems for materials projections. In conjunction with the committee's work on legislation this year to establish an entity for monitoring the supply and demand for resources, materials, and products, the committee will work with and exercise its oversight responsibility over the National Commission on Supplies and Shortages. This commission was established as a temporary body to examine current and future shortages of resources to report on means for averting such shortages, and to report on institutional adjustments for examining and predicting these shortages and other market dislocations in the future. The most important contribution the commission can make to national resource policies is to recommend the institutional mechanism for monitoring the supply and demand for essential resources. Its recommendations, as well as an assessment of the information system by the Office of Technology Assessment, a branch of Congress, will be carefully considered by the Commerce Committee as it proceeds on legislation for a materials information system. In addition to monitoring the availability of resources, the system should also have the capability to develop policy alternatives with respect to the resource evaluation of forthcoming shortages and market dislocations.

The establishment of such a materials information system was mentioned as long ago as 1908 at a governors' conference on natural resources and again by the President's Materials Policy Commission in 1952. The major question addressed by that commission, which is commonly referred to as the Paley Commission, is still relevant today: "Has the United States of America the material means to sustain its civilization?" Not if we continue to use materials and resources the way we have, totally disregarding the consequences of unrestrained use and refusing to require a systematic and coordinated approach to resource management. The 1973 report of the National Commission on Materials Policy made similar recommendations, and the 1974 General Accounting Office report on commodity shortages and the recently released report by the National Academy of Sciences also recommended the establishment of such an information system. The 1974 GAO report severely criticized the Administration for failing, during the 20-year interval after the Paley Commission report, to implement its recommendations. Consequently, the basic requirement for resource management continues to be the need for a coordinated system on materials information. The Commerce Committee held hearings on legislation for such a system last year and will continue to consider related proposals this Congress.

OBSERVATIONS OF A SENATE STAFFER

Richard Hellman*

Good morning, I am Richard Hellman, minority counsel of the Senate Committee on Public Works. My remarks this morning of course are my own and not necessarily those of the Senators for whom I work.

I wish to thank the Environmental Protection Agency for the invitation to speak and particularly for the opportunity to learn more about source reduction from the other participants in this conference. I congratulate EPA and particularly Ms. Eileen Claussen for staging this first EPA conference on source reduction. I am informed by Linda McCorkle and others on the Commerce Committee staff that source reduction is one of those areas which clearly falls within the jurisdiction of the Senate Commerce Committee and that therefore Public Works will not have to deal with it. So you could take my remarks this morning as those of an interested bystander.

I would be surprised, however, if this clear delineation of committee jurisdiction works out in practice. The Senate Public Works Committee has been deeply involved in all aspects of development of Federal solid waste authorities and programs.

In the 93rd Congress, the committee, under the leadership of chairman Jennings Randolph and the chairman of the Subcommittee on Environmental Pollution, Senator Edmund Muskie, and that of the ranking minority members of the committee and subcommittee, Senator Howard H. Baker and Senator James Buckley, set up a Panel on Material Policy under the subcommittee. The panel held 10 days of hearings on problems related to solid waste management and resource recovery and particularly on bills introduced by Senators Randolph, Muskie, Pete V. Domenici, Baker (by request of the Administration), as well as the bill reported by the Commerce Committee. Although some interesting testimony was given by State and local government witnesses and public interest representatives on behalf of source reduction, the hearings placed more emphasis on support for State and local solid waste programs, hazardous waste controls, and resource recovery incentives. The subcommittee then held a number of markup sessions in an attempt to arrive at a consensus bill for adoption by the full committee. Although the 93rd Congress elapsed before action was completed by the subcommittee, this work was not in vain. Based on last year's hearing record, the committee staff is working on a draft bill to present to the members for discussion in the next few weeks. Some members of the committee also may introduce their own versions of legislation dealing with solid waste. I do not believe that the staff draft will address source reduction in more than a cursory version, but some of the bills that the members are considering may deal more extensively with this area. It is interesting to note that of the three bills introduced to date, one, S. 13, cosponsored by a member of our committee, Senator Robert T. Stafford, is the Hatfield Returnable Beverage Container Act of 1975 introduced February 7 and referred to the Commerce Committee, and another, S. 661, by Senator Pete V. Domenici, is the proposed National Oil Recycling Act which deals with incentives to recycling of used oil.

---

*Minority Counsel, Senate Public Works Committee.

The Public Works Committee has dealt in comprehensive and nonpartisan manner with many difficult subjects in air and water pollution as well as noise abatement and solid waste management. I, therefore, look to a continuing search for facts by the committee in hearings and in staff meetings, field trips, and discussions with industry, labor, governmental, and public interest groups.

This year the Panel on Material Policy, which will hold hearings and attempt to report a solid waste bill, is comprised of Senators Gary Hart (chairman), Lloyd Bentsen, Robert Morgan, Robert Stafford and Pete V. Domenici.

One example of the Senators' continuing factfinding effort is a recent letter by Senator Domenici to the United States Brewers Association and others requesting comments on the recent EPA study on nine beverage container alternatives.

In terms of prognosis, I look forward to our committee reporting a bill that emphasizes assistance to States and localities to set up programs for advanced solid waste management and energy and resource recovery; incentives for resource recovery; and Federal procurement incentives. I would anticipate that the bill will not change the current EPA efforts involving source reduction, i.e., advice, assistance, guidelines, and information to help cities and States experiment with such programs. With the new composition of our committee and the Congress, however, I could be too timid in this prediction. In any event, I expect the Commerce Committee to deal more extensively with source reduction measures. Moreover I look to EPA and FEA, in cooperation with cities and States, to make a renewed effort to quantify the savings in energy and material which can be achieved through source reduction measures, perhaps as part of the President's overall "War on Waste" declared last fall. More particularly, I look forward with interest to the EPA recommendations for a phase-in version of the Packwood-Hatfield Bill, which John Quarles promised to submit when he supported the bill in hearings before the Commerce Subcommittee on the Environment last May 7. Perhaps the "specific mechanisms for efficient implementation" of the bill, which Administrator Russell E. Train said were still being explored at the time of his letter to that subcommittee last July 1, are now ready to be unveiled.

Meanwhile I look forward to examining more closely, at this conference and in other forums, the pros and cons of source reduction and particularly the experience of the States and localities which actually are implementing such measures.

THE NEED FOR ACTION GROWS

John R. Quarles, Jr.*

It is a pleasure for me to participate in welcoming you to the 1975 Conference on Waste Reduction sponsored by the Environmental Protection Agency. Seldom in the wide range of environmental problems we face do we confront a problem that is more vexing or more important than waste reduction.

Environmental protection has come a long way in this country, and we can all be justifiably proud of our achievements. The very proof of our success is the fact that environmental agencies are under pressure everywhere. As a nation, we are no longer merely talking about the clean-up of our air, water, and land—we're doing something about it—and beginning to see the benefits as well. The costs are also becoming apparent, and a certain amount of disenchantment has been the result. But that is natural.

Environmental protection is a new activity. It is a departure from the past. It represents change. Change, when it is real, inevitably causes a certain amount of pain. We are experiencing some of that pain now, and that is a healthy sign.

National concern over solid waste is a more recent phenomenon than our concerns for air and water pollution. Control of solid wastes has long been the neglected stepchild of the environmental movement. Along with the control of toxic substances, it represents the "open end" of a full system of environmental protection. So long as we can continue to dump solid wastes and sludges on the land without adequate controls, so long as we can manufacture toxic chemicals and introduce them into the environment without thorough evaluation of short and long term effects, the national structure to provide a safe and clean environment for the people remains unfinished.

The generation of waste is the consequence of our day-to-day living. High levels of waste generation accompany societies with advanced technology. The problem of waste occurs throughout the world. Where technological societies exist, there we see a growth in the solid waste stream.

But the United States is unique among advanced societies in the amounts of wastes we create. Our rates of waste generation far exceed those of other similar societies. We have made a fetish of convenience, and we purchase convenience by the expenditure of materials and energy.

---

*Deputy Administrator, U.S. Environmental Protection Agency.

In short, we are simply wasteful—using more material, more land, and more energy than is justified against perspectives of future need.

Waste and pollution are tied together. Use of materials and energy usually creates pollution of air and water, while at the same time it also causes waste generation. Waste generation results in further environmental degradation through inadequate forms of disposal. In addition, waste generation and disposal together mean that valuable raw materials are thrown away rather than utilized. This means that we must mine or harvest more materials and energy, with pollution the necessary result. Throughout the cycle of production and consumption, our current practices typically entail an unnecessary degree of both waste and pollution.

The problem is that our way of life creates patterns of waste that are seldom considered in the actual act of consumption. Few people think about fiber supplies when they tear off a sheet of paper toweling. Few people think about iron and tin ore imports when they toss away a can. And, until recently, few thought about international energy balances when they bought a bigger car.

These general considerations bring me to the topic of this conference: waste reduction, or source reduction, as we have called it in the past. The purpose of this conference is to emphasize that wastes must be reduced at the source, not merely managed at our incinerators, land disposal sites, and fledgling resource recovery facilities.

By waste reduction we mean to include every change in our production and consumption practices that will result in less waste of raw materials or energy and will reduce disposal problems. Shifting back to the returnable bottle is one example and a good one, though unfortunately far too few people recognize that it is only one of literally hundreds of good opportunities to achieve waste reduction.

We should, for instance, take a close look at our appliances to make them more durable and to strip away unnecessary features. We should redesign our products so that they do the job with less material. The life of our tires could be lengthened, thus saving resources. Smaller cars, as we have repeatedly said, consume less gasoline—and also use less material. We should favor remodeling and modernization in our buildings—rather than demolition. We should favor multiple-use items as opposed to disposables.

Another major need is to challenge existing practices in "modern" product packaging. The major purpose of a package is to protect and preserve a product. But the trend in packaging is going beyond that. Packaging users have become increasingly aware of the market value of packaging—the use of more elaborately designed packaging to attract the customer. Consumer convenience has also brought about increased packaging as shown by the market growth for food products packaged in convenient individual servings.

All of these factors have been responsible for substantial growth of the packaging industry. For example: Overall, the consumption of food in the United States increased by 2.1 percent by weight on a per capita basis between 1963 and 1971. In the same period, the tonnage of food packaging increased by an estimated 33.1 percent per capita, and the number of food packages increased by an estimated 36.5 percent per capita. Another example: Between 1960 and 1970, milk consumption decreased by 23.1 percent by weight on a per capita basis, but milk container consumption increased by 26.1 percent on a unit per capita basis. The trend toward increased use of convenience-sized containers provides another example. It has been estimated that elimination of all tomato juice cans smaller than 32 ounces in 1971 would have resulted in a reduction in steel use of 19.6 percent for this product. This one case illustrates how the use of larger sizes could produce significant benefits in resource consumption and solid waste generation.

Now let me turn to the basic policy issues raised by the rapidly emerging emphasis on waste reduction. Waste reduction is a radical concept. We might as well recognize that at the outset. It means basic change in our ways of approaching day-to-day activities. In this sense it is analogous to various other environmental and safety issues. Air and water pollution control, noise regulation, Federal supervision over foods and drugs, and transportation safety requirements—these and many other departures from a simpler time all were equally radical once, but they are now well accepted requirements of our society. Waste reduction also is radical—but no more so than the other activities that I have mentioned.

The traditional way of looking at products has been strictly from the economics of the marketplace. In our free enterprise system the marketplace dictates which products should be produced, how they are designed, what durability they shall have, what levels of energy consumption they require, how much they cost, and how many shall be made.

Conspicuously absent from these considerations is a concern for external effects that products cause. Neither producers nor consumers need to worry about the disposal of products. Nor do people consider products in relation to waste processing, their potential for recycling, their reusability, or their environmental, resource use, and energy effects.

It is precisely this lack of attention that has led to the dramatic increase in our waste generation and to the consequent problems of managing these wastes in the disposal phase. A new interest in reducing wastes at the source as a way to deal with these problems—by preventing the waste, rather than letting it happen and then cleaning it up afterward—is now forced upon us with urgency because in the past this aspect of the problem has been almost totally ignored.

In relationship to solid waste management, our patterns of production and consumption represent a classic case of unconscious exploitation. Let me illustrate that point.

Waste management has always been a public responsibility. Private industry participates in the activity, but the chief responsibility rests with the government as a result of public health concerns. Waste management systems have been established to deal with waste. Many of these systems, especially the large urban systems, are publicly funded—from tax revenues—whether publicly or privately operated. Significant increases in the volumes of waste which result from the myriad individual decisions of producers and consumers are overloading most systems. The public manager is frequently unable to expand his capacity, to find disposal sites, and to raise the money necessary to deal with the increased burden. In a fiscal sense, he competes with other needs—needs that often seem more pressing—public safety, education or transportation. Of necessity, he reduces the services provided, tries to make do, and the result is dangerous to public health, both in the collection and disposal phases of operations.

The fact is that problems of handling municipal solid waste are reaching alarming proportions. The levels of waste generated per capita continue to mount ever skyward. This effect is aggravated in most metropolitan areas by continuing population growth. The historic city dump is overwhelmed and obsolete. Municipal incinerators consume valuable fuel and cause air pollution problems to boot. Pressures for development are squeezing out sites for land disposal. Moreover as tight controls are imposed on air and water pollution, new quantities of municipal and industrial solid wastes are being created that must also be disposed of. Meanwhile the daily volumes of trash and garbage continue to grow. Easy relief is nowhere in sight.

Another aspect of the dilemma faced by the waste manager concerns resource recovery. Resource recovery has traditionally been practiced by making presegregated waste materials ready for the market. Elimination of contaminants has always played a major role. The municipal manager is faced with the same requirement. He must process the waste in such a manner that it can be sold. This creates both a need and a desire to influence that which is thrown away—to eliminate contaminants at the source rather than being forced into high-cost adjustments in the separation or conversion process. A production system which can and does dump anything and everything on the waste manager, regardless of such considerations as recyclability, is counter-productive to a resource recovery thrust. Hence pressures for product controls arise. These pressures will grow more intense as the problems become more serious.

In this connection, let me make one point. You have probably heard the argument that recycling rather than waste or source reduction is the answer. I disagree with that philosophy. We must do *both*. After all reasonable waste reduction steps have been taken, the remaining waste should be recycled. Thus a double benefit can be achieved.

Waste reduction has yet another aspect—one not connected directly with solid waste management. Extremely high materials and energy consumption practices are creating a debt against the future. The mortgage on that debt will be passed on to unborn generations. Production and consumption decisions are not made with a long-range view of materials and energy availability in the future. They are based on current prices and expectations. By squandering our resources today we are jeopardizing our well-being for tomorrow.

The usual argument is that the future is uncertain. That technology will develop to allow us to obtain the energy and materials we shall need. That marketplace adjustments will take place as shortages occur. Hence, there is no need to worry today about energy and materials supplies in the future—or at least no need to worry to the extent of interfering with free market forces at the present time to obtain uncertain future benefits.

The argument is sound enough so far as it goes. What it leaves unsaid is that the market mechanism is imperfect at best. Valuable materials which are dispersed into the environment in minute quantities, for example tin as it coats metal cans, are irretrievably lost. Short-term dislocations have severe political consequences, both domestic and international. In this day and age I need not stress that point. The public has little patience with the market mechanism when it comes to waiting in line for gasoline. The national government is held responsible—and rightly so, I think—for failing to foresee and to make provisions for unpleasant contingencies. Just because the *future* is uncertain does not mean that we should not manage the *present*, especially if the costs are reasonable and the benefit predictable.

It is therefore sound national policy to work toward reasonable materials and energy practices, to reduce waste generation at the source, and to ensure that valuable resources are not needlessly lost.

Let me now discuss some problems of implementing waste reduction approaches.

Our economy is what it is—a tremendous investment of capital and skill in a complex and highly interlocked production system. It cannot be changed overnight. Even minor adjustments can have major welfare impacts in unemployment and lost productive capacity.

Waste reduction approaches, especially legislatively mandated approaches, imply adversity for some sector of the economy. This is not an area where abrupt changes can be made without a good deal of reflection and planning. The benefits stipulated for waste reduction—saving resources, avoiding waste and its environmental consequences, and ensuring a balanced pool of materials and energy for our grandchildren—should be carefully balanced against the costs and impacts. Decisions cannot be made lightly.

The key to successful waste reduction is orderly transition. Assuming that some change in production is desirable—how is that goal to be achieved? How should the transition be managed?—knowing that no change can be made without paying some type of penalty.

This critical element of transition is the foundation for the Environmental Protection Agency's policy on beverage container legislation. A year ago in May, I testified on Capitol Hill in favor of the concept of a mandatory national beverage container deposit requirement. One aspect of that testimony has been largely overlooked. It was an insistence that any such legislation be phased in over time, in such a way that the adverse consequences of such legislation would be minimized or eliminated.

I said earlier that the concept of waste reduction is radical. Because it does require fundamental change it is highly controversial, and discussion of it often is dominated by extremists. Most of the debate over waste reduction has been polarized between those who want rapid change, *now!* and those who want no change, *ever!* This polarization skirts the central issue—how can we effectively make changes as soon as possible and at the least cost in welfare.

Let me make clear the position of the Environmental Protection Agency. It is the middle ground position which all must come to in the end. We recognize that immediate transformation of established practices cannot be obtained. We recognize that existing capital investments must be counted, and that people's jobs must be counted even more. We recognize that no change should be commanded until all of the benefits and the costs have been calculated. We want to be reasonable, and we will be careful. But we are insistent that certain changes can be made.

The objective of waste reduction is not to change the world overnight. The objective is to change the direction of current patterns. The objective is to make a beginning to reduce the practices of waste that have proliferated throughout our society.

Because we do desire to proceed with care it is especially important that progress be made through cooperation. Public education, industrial cooperation, and improved practices must go hand in hand. Surely the most promising and least disruptive way to implement waste reduction in all areas would be by cooperative agreements between the various interests involved: labor, industry, the citizenry, and government.

I am well aware that voluntary programs have a limit. Nevertheless, voluntary approaches to waste reduction must be tried. Russell Train, the Administrator of EPA, is committed to this route along with other approaches. The success of voluntary efforts will in large part determine how much farther it is necessary to go.

Let me sum up my observations as follows: Waste reduction is a necessary part of the total effort to bring our productive and consumptive functions into harmony with environmental preservation. It makes sense from a waste management and a resource conservation point of view, it eliminates pollution, and it facilitates resource recovery.

Under Congressional mandate, EPA is charged with the exploration of various waste reduction approaches. Our findings are submitted to Congress in annual reports. Our chief concern is with the problems of implementation: how to bring about change at least cost. In that area, far too little thought and analysis have taken place, and I certainly hope you will address yourselves to that issue.

All of us, I believe, share a common concern for a better world—one which is cleaner, safer, and more predictably stable than the world of today. As we work toward that goal, waste reduction is one of many tools we should use—but wisely.

Industry and Labor Perspectives

INNOVATION VERSUS REGULATION: INDUSTRY VIEW

William Cadd*

I would like to thank Arsen Darnay for pointing out this morning that this conference is really concerned with source reduction and that the focus of that issue is still pretty much where it has always been—on beverage containers. For, as Linda McCorkle said, beverage containers form a symbol. The source reduction movement really doesn't seem to have many other arrows in its quiver. I've heard mention of radial tires, paper, and automobiles this morning, but little else. I am curious and would like to hear, through the course of this conference, about ideas for source reduction other than just beverage containers.

Since lunch I am faced with a real problem because John Quarles was so conciliatory that I feel bad about taking the gloves off, but then that's never bothered me. As I understand my assignment today, I am to present one of several industrial perspectives on the subject of waste reduction. Let me make it clear that any perspective I may offer is mine alone and not that of any particular industry. Now I would like to note that when Eileen Claussen called and asked me to participate in this seminar, she told me the subject was to be that of source reduction. However, in the good Washington tradition of coating very bitter subjects with political sugar, we find that the title of the seminar is "Waste Reduction." That is a theme which must provoke a positive response rather than provoke the latent hostility which is enmeshed in source reduction. One of the publicity pieces for the seminar says that this first day's program is to examine institutional and attitudinal barriers to waste reduction. So I would like to position myself at the outset as a representative of an attitudinal barrier, which is hostile to the concept of source reduction, as I understand it, through governmental intervention in the marketplace. Having then taken such a position, I think it is incumbent upon me to state my understanding, or perhaps lack of understanding, of the goals and the issues involved in the source reduction movement.

Reduced to its simplest terms, I see the goal of this movement to be a reduced population, depleting finite resources at a slower rate, having more leisure time, and approaching an equilibrium state with nature so as to maximize the lifespan of the finite resources of the planet Earth. In other words, this is an issue which goes far beyond the relatively simple question of

---

*President, Glass Container Manufacturers Institute how Montgomery County will get rid of its garbage. By golly, I found it kind of hard to disagree with that overall goal as I sat writing this speech by a palm shaded swimming pool in Florida. Surely, this is a wonderful, utopian dream of the activist segment of the comfortable middle classes.

In all fairness, serious scholars firmly believe that such a shift must be made. But I am not about to debate the law of entropy. Also, in fairness, I think that some source reduction proponents recognize the potential adverse impact of these concepts on some segments of society. We heard that today. Indeed, some proponents manage to turn the argument around and point out that by increasing the durability and useful life of manufactured goods, the consumer will be better served than he or she is today with allegedly shoddy merchandise and built-in obsolescence.

It seems to me, then, that the real fire and brimstone which surround the matter of source reduction really arise first, from the time frame for the achievement of a balanced system; second, and more importantly, from the question of how we get there from here; and third, and most importantly, from the question of who should control the journey. Among the suggestions that have been made to meet the basic problem of resource depletion are: population control, education to achieve a conservation ethic, product redesign (either voluntarily or by inducement or legislation), pollution taxes, depletion quotas, and resource recovery and recycling.

Consider the time frame, for the solutions to be adopted must be influenced by the time in which we must act. Advocates of immediate action point to some landfill operations which have reached the saturation point, while per capita generation of waste is increasing. These advocates can point also to polluted water, polluted air, electrical brownouts and blackouts, and dependence on unpredictable foreign sources for critical raw materials and energy. I must say that I personally do not find any cause for panic over those situations. A crisis attitude is not, in my opinion, justified. We are making progress, I feel, in air and water quality, and even there, serious consideration is being given to extension of deadlines previously enacted in a crisis atmosphere. New means of waste disposal and resource recovery are becoming available to alleviate the waste disposal problem where it exists. Substantial amounts of money and talent are coming from the private sector. The shortage of fossil fuels comes as close as any to stimulating a sense of urgency. But the urgency of that situation to me seems presently to be more a matter of international politics and economics than of resource depletion.

All human endeavor requires energy. Unless you are willing to opt for social control of how a consumer will spend his leisure time, I would not be optimistic that a policy of lower productivity and more leisure time will result in net energy savings. Why is Florida having such a banner tourist season in the face of a recession? Obviously, I think we must be more careful with our use of fossil fuels, but more importantly we need new energy sources. I recall a motto which I once saw in a telephone company vehicle. It went something like this, "No job is so important, no service so urgent, that we cannot take time to perform our work carefully and safely." I think that motto is quite important in the quest for striking a rational balance between our standard of living and our finite resource base, including energy. I think that even with regard to energy, we have time to do the job without drastically upsetting the social and economic structure.

Proponents of source reduction argue that we cannot continue to pursue a policy of constantly growing GNP and an increasing convenience-oriented standard of living. I disagree because I think that the constant struggle of man to improve his lot on earth provides the spark for creative genius. I think that we can and should pursue an increased standard of living, but I think that this quest must be tempered with a realization that everybody cannot have every material thing which he may desire. I personally believe that our current economic problems in this country have roots in what some of the source reductionists term "growth mania." But, please, do not blame the situation on industry and its advertising alone. Government itself must shoulder a very large portion of the responsibility, with its promises of a fair share to all and its heavy-handed interferences in the marketplace. Now, as a nation, we are being forced to pay the piper and face up to the real costs of our standard of living.

Some agonizing changes are being wrought in our society. Witness the price of energy, which is forcing reevaluation of family budgets as well as industrial budgets across the land. Automobiles appear to be starting a shrinking process. My industry is feeling an increased demand for the home canning jar. In fact, our statistics for February even show increased shipments of returnable bottles over the same month a year ago. My point is that changes are being made, some faster and some slower. So in terms of getting into better balance with nature, I see a time frame of decades if not longer.

How are we to make this trip from where we are today to where we ought to be? And who will control the trip? I do happen to believe that the scientific and industrial communities can provide a technological fix to better balance the supply and demand of many resources. Certainly resource recovery from the solid waste stream is an idea whose time is upon us. Now, if you are one of those who see the law of entropy as a limit on the concept of resource recovery, then I suggest that you focus your personal energy upon the problem of harnessing solar energy, so that we can optimize the use of our finite, terrestrial resources and in turn optimize the overall standard of living.

How much government is going to be required to oversee this transition? Very little, I hope, for I happen to have great faith in our political and economic system. I am reminded of a conversation a few years ago when I was traveling with Professor Phillip Kurland, the eminent constitutional scholar. The conversation concerned the so-called Watergate matter and its many sordid facets. One person in the group was lamenting that our whole political system was threatened. Professor Kurland made the observation that, to the contrary, the system seemed to be working remarkably well, and I think that the end result demonstrates the validity of his remarks, for the legislative and judicial branches did exercise control over the executive branch.

I am similarly optimistic that our economic and political systems can function to bring a better balance in the matter of resource utilization and the standard of living. The pricing mechanism is already at work reordering some consumption patterns. I believe that there is some evidence that the price of gasoline has helped to stem the growth rate of gasoline consumption. By definition, the money being removed from consumer pockets by utility fuel adjustment charges must be restricting other consumer purchases and altering patterns of consumption of electricity. Technology is moving in the direction of better resource utilization. It makes sense to utilize our solid waste as a fuel source as it is being done by the Union Electric Company in St. Louis. I would not deny that political and moral pressures generated by the environmental community have had a substantial impact in moving the industrial machine, and to some extent the popular ethic, in this direction. So I see the role of government in this whole process as primarily a role of monitoring, advising, and assisting the process; not a role of substituting government planning for the right of free choice. I think the government has a pretty bad track record in the manner of economic planning. I cite the position of mass transit and the railroads along with wage and price controls as horrible examples.

The government should keep the information data base on our resource problems up-to-date and well publicized, as with this conference. It should act where necessary to stimulate technology. It should keep channels of capital formation unclogged. It should set some reasonable rules for air emissions and water effluents where necessary. And only as a last resort, should it enter the market and ration resources. I do not think we are anywhere near that point of last resort except as periodic aberrations appear, such as the Arab oil boycott.

The government should not enact pollution taxes, or worst of all, product standards. In order to achieve any semblance of fairness, and hope to achieve the desired goals, taxes would have to relate to the impacts of various products or processes. I see the definition and measurement of such impacts as an incredible morass, requiring yet another level of bureaucracy in a government already swollen to an almost intolerable point. The setting of product standards would be even worse in my opinion. Automobile seat belt-ignition interlocks are enough evidence to convince me that we don't need the government's help in product design. For those who disagree with me, I recommend the reading of the Interim Staff Report of the

House Committee on Public Works, Subcommittee on Investigations and Review, concerning Public Law 92-500, the Federal Water Pollution Control Act. In the interest of time, I will not quote from that, but it is a very instructive document. The document paints a very dismal picture with respect to Federal control of water quality and the complications thereof. I submit that overreaching Federal intrusion into product design offers an opportunity to make the problems of the water law look almost ridiculously simple by comparison.

On the other side of the coin, Federal participation in projects to push solar energy is, in my opinion, a reasonable use of our government resources which themselves are limited, even though that limitation is not always—in fact hardly ever—recognized.

Let me summarize. I agree that there is a need to do a better job of husbanding our finite resources. I believe that we have time in which to accomplish this goal. I think we are already moving in that direction as evidenced by our leveling population trend, some of our consumption patterns, and some of our industrial processes. Increased technology is necessary and can help us in reaching this goal. The pricing mechanism in a free market can and is already starting to cause shifts in products and processes to reduce resource depletion. The role of the government in the marketplace concerning this problem should be minimal except in extreme situations. If that position is a call for laissez faire, so be it, for I do have more faith in our free market system than I do in our present bureaucratic structure.

Leviathan has grown too much. The struggle to feed it is becoming crushing. Source reduction is one issue where we should draw the line as the President did and say "No more government growth." Let source reduction begin right here at home in Washington with the Federal establishment. It is time for labor and industry to join together and bring the bureaucratic structure under control. The issue of beverage container legislation has shown that labor and industry are natural allies in the defense of a free market system. Let us expand this coalition and get on with the job of bringing government under control.

A FOOD INDUSTRY PERSPECTIVE

David James*

My comments this afternoon are aimed at clarifying some of the challenges faced by packaged foods processors in reducing solid waste. When I received the EPA invitation to participate in this conference, I was told that the purpose was to examine the challenge of product redesign and reuse and product life extension as a means of reducing solid waste.

I believe that my contribution in response to this is first to present a few facts about the kinds of waste we generate and handle at our factories and then to proceed to the more difficult issue of dealing with packaging material wastes.

FACTORY SOLID WASTE

We operate several factories that process agricultural commodities, such as corn, green beans, and peas to package prepared food products. On a visit last fall to one of our factories processing corn, I noted that we were receiving about 150 truckloads a day of corn from nearby farms. At the same time, about 100 truckloads of corn residue per day, comprised of husks and cobs left behind after the corn was processed, were being hauled back to the farms as animal feed.

I happen to believe the example of factory corn processing is the kind of activity that makes common sense. It is very efficient from an energy viewpoint in that the trucks return back to the farms with a load rather than as empty vehicles. The corn husks and parts of the cob are recycled to feed animals with no further processing.

What are the possible alternates? If you send the corn to a retail market as fresh corn on the cob, you have the same solid waste of corn husks and cobs ending up in the housewife's garbage can. The transportation cost and the disposal cost are higher and new problems are created. My point is this—the present system of food processing is cost effective and solid waste effective because competition made it that way. If you want your corn on the cob fresh when it is in season, you have the freedom to choose and pay for such a version. In the winter, when fresh corn is generally not available, the supermarket gives you a choice of canned or frozen corn.

---

*Director, Environmental Control, General Foods.

With this choice comes a different disposal problem. I doubt that "product redesign" is a viable alternate for corn on the cob or cut corn. The use of the factory would seem to be more efficient than the housewife placing the same waste in her garbage can. For disposable food items, such as corn, it would appear that the packaging materials are a small price to pay.

Another example, using a different factory waste, coffee grounds, can illustrate another approach. Anyone who has ever cleaned out the coffee grounds from a percolator at home knows that this soggy material should not go down the drain of the kitchen sink and can leak through wrapping paper. What would you do if you had three large factories making millions of cups of instant coffee every day? Our largest plant has about 180,000 pounds of soggy coffee grounds, which is equivalent to about 40 truckloads a day. At one time, this was a real problem to a nearby landfill disposal site. Luckily, we found a better way—especially in these days of energy shortages—was to burn the grounds in a special boiler. The fuel value of the grounds is sufficient to supply about one-third of the steam needed to run the coffee plant.

We are just one of many companies that have collected their facts on factory waste. Once we have the facts, the economic solution usually turns out to be the best answer for solid waste. I would hope that future regulatory efforts would continue to recognize industry's capability of solving most of its solid waste problems.

PACKAGING WASTE

In 1974, EPA issued Resource Recovery and Source Reduction: Second Report to Congress, which singled out a few special wastes for study purposes. The report covers automobiles and recycling, beverage containers, rubber tires, and packaging as special waste problems.

I believe the packaging solid waste reference material contained in the EPA report gives adequate facts to show that packaging is the largest and one of the fastest growing product classes in municipal solid wastes. The major functional purpose of all packaging is to protect the item that is being packaged.

The primary purpose of food packaging material must be product protection to achieve quality attributes and exclusion of contaminants. I am concerned that the EPA efforts on packaging wastes source reduction could be in eventual conflict with Food and Drug Administration and U.S. Department of Agriculture food protection efforts. I believe we must give priority to food safety. We recognize the need to go beyond the product protection criteria, however, into areas such as disposability.

Disposability of Packaging Materials

General Foods recognizes its responsibility to take practical steps to avoid pollution of the environment with packaging wastes. Every effort is being made to minimize waste by eliminating excessive packaging material and to ease the solid waste problem by utilizing the most disposable package consistent with practical considerations.

All new and revised packages are reviewed for ultimate disposability by the responsible division. The purchase specifications covering packaging material and the package design take into account the return of the discarded package to the environment to minimize packaging pollution.

Actually, 86 percent of our packages are made of materials that are handled without trouble by municipal waste disposal systems. Virtually all of our food products are opened and used in family kitchens and disposed of through municipal systems. The remaining 14 percent are either cans or jars, and about a third of these are reused by consumers as containers in the household.

RECYCLING AND REUSE

In 1971, we joined with a number of corporations and other interested parties to organize the National Center for Solid Waste Disposal. Later, the name was changed to National Center for Resource Recovery. This agency is evaluating the increasing number and variety of techniques that are being developed to conserve natural resources through new ways of handling solid waste of all kinds. For example: melting down cans to make more cans—a closed, waste-free cycle. It seems certain that significant progress will be made in this area in the years ahead, and we will be watching closely, ready to adapt wherever we can to conform with new ways of handling these kinds of waste.

Meanwhile, we are especially concerned with the ecological benefits of using paperboard made from recycled material. Seventy-eight percent, by weight, of all paperboard used for General Foods' product packaging is now manufactured from recycled materials, and we are constantly examining and re-examining ways in which even greater amounts can be employed.

There are a number of technical and regulatory considerations, however, that must be dealt with in the use of recycled paperboard. With corrugated shipping cases, for example, the use of recycled paperboard is likely to come more slowly because of technical problems related to strength and durability. The use of recycled paperboard for frozen food packages has proved impractical, because such board cannot resist wax penetration, with resultant package discoloration.

Other products—such as powdered desserts, rice, cereals, and pet foods—can be packaged with recycled paperboard without any resulting disadvantages.

Ways to further utilize recycled paperboard, as well as methods of improving the board itself, will certainly be found. This corporation performs constant research in this area, while keeping in close communication with appropriate government agencies and industries. When new developments occur, General Foods will quickly employ those new uses for recycled paperboard which prove practical.

In closing, we believe that the present economic climate will continue to place heavy emphasis on cost reduction of packaged food products. Many of these cost reduction efforts will involve the reduced use of packaging material; thus, the compatibility of cost reduction with waste reduction. Package redesign can help reduce the use of packaging materials. We have gone to lighter sheet metal gauges in cans, thinner and lighter weight glass jars, and alternate paper and plastic film laminates wherever it has been feasible in the past. We will continue to pursue promising packaging options in the future.

CONCERNS OF LABOR

George H.R. Taylor*

I appreciate this opportunity to present to you the views and concerns of organized labor regarding the serious and growing problems of solid waste in America, and in particular regarding the issue of source reduction as a possible solution.

Before this informed audience it is hardly necessary to explore the same field and recite the statistics which describe quantitatively the Brobdingnagian dimensions of the waste products of our society being spewed upon the American landscape. What this does in adding to and complicating the problems of pollution abatement, land use, depletion of the nation's and the world's raw materials and energy resources base, esthetic blight, and threats to the public health is only too well known.

A quarter of a century ago, the Paley Commission warned that the United States was rapidly becoming a have-not nation with respect to many of the raw materials essential to the workings of our economy. In 1973, the final report of the National Commission on Materials Policy, established under the Resource Recovery Act of 1970, pointed out a worsening situation in the U.S. dependency on foreign sources of raw materials and energy fuels, further complicated by worldwide shortages and higher costs resulting from competition by both industrialized and developing nations.

The whole solid waste problem has also been caught up in the so-called energy crisis, which crowded on the public stage with the Arab oil embargo in late 1973. This aggravated an already severe inflationary cycle which in turn has been followed by an economic recession and high unemployment. As a result, there has been a shift of immediate concern from the pollutional and land use impacts of solid waste to a more immediate preoccupation with the drain on nonrenewable raw materials and use of energy fuels.

For convenience the evolution of the attempts to solve America's solid waste problem can be divided into three phases: (1) collection and disposal; (2) recycling and reuse, which holds great promise in taking our raw materials through a closed cycle of use, salvage, reprocessing and reuse; (3) source reduction, a concept predicated on an assumed critical shortage of key raw materials and energy fuels, which would leap to the ultimate by reducing the generation of solid waste at its source.

---

*Economist, Department of Research, AFL-CIO.

The proponents of an immediate source reduction program would apparently abandon recovery-recycling-reuse programs. The sharp edge of the source reduction approach has been in the area of nonreturnable beverage containers—cans and bottles.

Source reduction reaches far into the marketplace. Not enough is known of its full needs, methods of implementation, and consequences for it to be established as a policy. Should circumstances force the United States to curtail drastically its high energy and high materials use, this would have a revolutionary effect on economic growth, living standards, and employment. Such a decision would not be the responsibility of the Environmental Protection Agency with regard to actions resulting in drastic restructuring of this nation's socioeconomic institutions. It would come about only after a far broader and more comprehensive examination of all aspects of the problem than has thus far been given to it, and by a far broader constituency, namely the American public. EPA's part in its implementation would be only that which its congressional charter, now or in the future, would permit.

As a matter of fact, EPA itself seemed to realize that the hour of source reduction implementation has not yet struck. Its second report to the Congress in 1974 on resource recovery and source reduction has this to say:

> . . . product controls could have profound impacts on the market system because they involve direct control of product design or consumption levels. The effect of these measures is difficult to predict and hasty reaction could result in significant economic dislocations. For these reasons it is important to proceed very cautiously in this area and to consider options that are reasonable, fair and equitable.
>
> At present, there is insufficient information to evaluate the necessity or desirability of product control measures. . . .

Yet, EPA is cautiously adding fuel to the fire of the first push for source reduction in the form of banning the use of nonreturnable beverage containers either by act of Congress or legislation and ordinances at a State or local level. Two recent, identical statements made by EPA representatives before the Vermont and Massachusetts State Legislatures considering such legislation advocate national legislation requiring a mandatory deposit phased over a period of time "and with proper controls" in order to eliminate State and local divergencies, but in the meantime making it plain that EPA does not oppose such State and local laws and ordinances which minimize "economic dislocation" and anticipate national legislation.

EPA and environmental groups pushing for this kind of program should pay more attention to its economic and social consequences. In fact we believe that it is their obligation to do so, just as it is the obligation of the AFL-CIO and its unions to understand the need to clean up our environment, and support programs that are soundly conceived to move toward this goal. This the AFL-CIO has done from the first piece of legislation on water pollution to the present.

But, it is on the container legislation issue that we part company with the environmentalists and without qualification.

The arguments in favor of source reduction in the beverage container field reflect a singular myopia on the part of a number of environmental groups both national and local. This myopia takes the form of either an inadvertent or a calculated failure to try to understand how people in this society live and what they want out of life; this leads to solutions which are either irrelevant or anathema to large groups of fellow citizens. Some of this may result from the cultural alienation of America's middle class in our post-industrial society—from the poor, from minority groups, from problems associated with achieving upward mobility of the poor, in short, not equality of opportunity, but attainment of equality of results.

Although in many areas there has been some improvement in curing this environmental myopia, it appears to be difficult to concern many environmentalists with the necessity of overcoming their basic distrust of the nature of man in the total eco-system and developing a workable accommodation between man as a part of nature and man as a social and political creature.

The ban-the-bottle-and-the-can issue is a case history in this regard. First, this has been made a major strategy in resource and energy savings in a fashion that far overstates the case. Second, it disregards the problems of job loss by applying macroeconomic assumptions that there will be a balance struck in new jobs created as against existing ones lost.

Considering the first assumption, we consider it to be fallacious in several respects since it provides too little a benefit at too great a cost. The proportion of solid waste contributed by beverage containers is a minor part of that thrown out upon the landscape from packaged containers of all kinds. They contribute only about 20 percent of total highway litter, albeit they are the most visible and esthetically offensive of the lot.

The beverage industry uses 1 to 2 percent of total industrial energy, which means about .4 to .8 percent of total national energy use. Cutting down this use by a fraction would have little impact on our national energy status, but it would have an inordinately large impact on jobs. Furthermore the ban-the-bottle-and-can proposals leap over workable strategies for recycling which are being developed and in some instances already in use.

As to job loss, this has been estimated by EPA as being in excess of 60,000. These are highly paid, skilled, and permanent jobs. The EPA estimate that there could be a replacement of the equivalent number of other jobs in washing and distributing and handling containers is a statistical cop-out.

In the first place the replacement job would be an unskilled one at $4,000 to $5,000 a year as against the wages paid to present workers in the container industry at three times that amount, together with a large number of fringe benefits, health services, pensions, insurance benefits, paid vacations, and holidays. Most wage earners in the container industry are family breadwinners in their middle years. The tragedies that would multiply from their displacement would be stark and manifold. It is questionable whether many of them could ever successfully bid for the newly created lesser paying jobs of bottle sorting and washing because of factors such as location and age.

Working people constantly face the hazard of job loss. That hazard is as close to home as last month's unemployment rate published by the Bureau of Labor Statistics, and the long lines of working men and women standing in line at unemployment compensation offices. Changing markets for goods, automation, export of jobs overseas by multinational corporations, pressure of imports, accidents and ill health, plant relocation or company bankruptcy—all can spell personal disaster. Among middle-aged and older persons the price in loss of both hope and dignity is often beyond calculation.

Organized labor has long fought and continues to fight for programs which provide income protection and alternative employment for such victims.

Congress certainly has the right to abolish by legislation or regulate the manufacturing, distribution, and sale in commerce of socially harmful goods. But, before such action is taken in the beverage container industry, action that wipes out thousands of livelihoods, it must be demonstrated beyond doubt that the potential benefit to society will far outweigh the costs. We have concluded that beverage container legislation, which I have been discussing, can produce only very limited social and economic benefits that weigh very little on the scale against the costs of many thousands of workers' jobs.

The proponents of prohibitions on the use of nonreturnable beverage containers, in this case history illustration, have accomplished one other thing. By talking mostly to themselves, elected public officials, and EPA, they have apparently decided to engage in no discourse with the labor movement. The result has been that our unions involved in the beverage container industry have been forced to make common cause with their counterparts in management to oppose, each group for its own reasons, this legislative approach wherever it appears. A better job of alienation could not have been done.

I want it understood, however, that the AFL-CIO and its affiliated unions are not dinosaurs in the field of solid waste management. I will read to you portions of the AFL-CIO policy statement on this issue:

> A clean environment and full employment are not incompatible; in fact, they can and should go hand-in-hand.
>
> Labor's position is especially pertinent in relation to the twin problems of solid waste disposal and depletion of valuable natural resources. The answer to these companion problems lies in transforming waste into usable products.

The answer does not lie in proposals to ban disposable cans and bottles or to curtail use of certain materials. These proposals are really "nonsolutions." By disrupting industry and causing heavy losses of jobs, more problems would be created than solved.

Similarly, we reject proposals that would: (1) place a hidden excise tax on products containing certain materials, or (2) expand the depletion allowance tax loophole to companies that use waste materials. The depletion allowance loophole has encouraged using up valuable natural resources and has not provided for prudent materials use policies.

The Federal Government must expand its effort in developing new techniques for disposing of solid wastes, recovering valuable materials from wastes and for using wastes in new ways, such as fuels.

To do this, the Congress must greatly increase the solid waste budget of the Environmental Protection Agency that was slashed by the Administration. With increased funds the EPA could assist local governments in establishing alternate measures for disposing of solid wastes.

In short, we do have a positive program and a far-reaching approach to commit this country to a policy of resource recovery. We would be the last to say that this symposium on source reduction will not have its positive aspects. This issue deserves more light and less heat. I hope that from it will stem a more constructive exchange of views and information by all concerned than exists at present.

ENVIRONMENTAL PROTECTION AND PRODUCTIVITY

James R. Peterson[1]

With energy shortages and accelerated costs of energy and other critical materials, there is ample economic justification to discuss the subject of more efficient energy and materials usage. It is becoming increasingly apparent that value can be extracted from what we don't use —by using what we need more efficiently and by increasing the uses for materials traditionally thought of as waste. These considerations are both environmentally and economically sound. In fact, good environmental management must be viewed as a straightforward aspect of good management, a key ingredient of any corporate productivity program.

We have been practicing this kind of management for years. In 1972, we made these concerns explicit by establishing a corporate policy to protect the environment which states in part that:

The Pillsbury Company will protect the public interest in all of our activities which involve the use of natural resources or have an impact on the environment and will support legislative and regulatory efforts to develop sound environmental programs. We will adopt a leadership role in providing a high quality of environment at our facilities.

Our consumer divisions have had, since 1972, policies concerning environmentally sound packaging. These policies embody our intentions which are to minimize the total amount of packaging material used compatible with the food products' protection needs and good manufacturing and marketing practices. It is our policy to use as little packaging material as possible and use recycled and biodegradable materials whenever possible. Our businesses are required to establish and maintain written policies and procedures necessary to assure that each of our companies will take all practical means to carry out these policies and to assure full compliance with the spirit as well as the letter of applicable laws and regulations.

Let me take a few minutes to tell you more specifically about some of the things we have done and are doing.

PACKAGING DESIGN

We consider packaging to be an essential concern both for our business and for protection of the environment. When considering the design of an economically and environmentally sound package in the food business, we must take into account in order of priority the following packaging issues.

---

[1] President, The Pillsbury Company.

1. The packages must be safe and maintain the safety of our food products.
2. Considerations of total package volume and quantities to be sold.
3. The product life protection quality—that is, the ability of the package to maintain the product's quality over its intended life, consistent with our distribution system. For our kinds of food products, these time periods range from 30 days for refrigerated products to 11 years or more for grocery mix products.
4. The package's physical strength must be consistent with the expected handling exposure occurring in our distribution systems and the distribution systems of our customers and consumers.
5. The package must provide good consumer service, that is, be usable by the consumer.
6. The package must be merchandisable, that is, meet our marketing standards.

Package Optimization Program

We have a constant and vigorous package optimization program whose objective is to encompass the above priorities and our environmental concerns as economically as possible. Consider the following examples illustrating our efforts to use less packaging material, use more recycled material, and use biodegradable materials whenever possible.

Use of Less Packaging Material. I stated we have as our goal to use as little packaging material as possible. Over the last 10 years we have had a program to reduce the amount of metal used in our refrigerated can ends. During this time, we made a 16-percent reduction in the amount of metal used in these can ends which is equivalent to a waste reduction of about 11.1 million pounds per year. This was achieved by extensive work and cooperation between ourselves and our supplier and required the development of new end designs, stamping techniques, and a considerable amount of new equipment. This work resulted in can ends which perform with a higher level of dependency than the old ones. This reduction of use of metal not only saved us money and reduced waste but conserved considerable amounts of energy associated with the production of raw metal and its final disposal.

Last year we switched to the use of trays instead of carry-out bags for Burger King customers choosing to eat in the restaurant. This resulted in a 10-percent reduction in the total amount of paper and paperboard used in Burger King. We are presently working on the reduction of bag size in our Burger King operations.

By increasing use of bulk handling systems for bakery and industrial flour, which we have promoted vigorously, our consumption of multiwall paper bags has been decreased by about 11 million pounds per year.

Use of Recycled Materials. Not counting Burger King, Pillsbury uses about 100 million pounds of paper and paperboard each year of which more than half (approximately 53 percent) is recycled fiber. Essentially all of our folding cartons and can body stocks are derived from this recycled paper and paperboard.

Use of Biodegradable Materials. In addition to reducing amounts of packaging material and using recycled materials whenever possible, we strive to use biodegradable materials whenever possible. As just noted, paper and paperboard are used extensively and are fundamental to our package design. We use as little plastic and metal as possible. All of our paper and paperboard is biodegradable, which accounts for the 100 million pound figure mentioned above for Pillsbury, exclusive of Burger King.

Eighty-eight percent of our Burger King refuse stream is biodegradable. This is not insignificant since we generate about 1,300 pounds per week from each of our approximately 1,100 Burger King stores. We are presently working to replace our styro shell used on the Burger King Yumbo and Big Plain Sandwiches.

LESS GENERATION OF SOLID WASTE

Waste reduction is not only a packaging consideration, however. Most of our manufacturing facilities do not generate substantial amounts of solid waste. We do, however, have a major potato manufacturing plant which processes the raw potato into finished dehydrated potato mix products. In 1971, we started a program to convert essentially all of our potato waste into animal feed. Since then, we have established our own feed ingredient plant which utilizes potato peels from our potato manufacturing plant and others to make animal feed. This essentially eliminated the generation of about 30 tons of potato waste each day and, in the present time of food concerns, permitted us to convert a food waste not fit for human consumption into an animal feed.

We are presently experimenting with an exciting idea in one of our refrigerated food plants. In cooperation with the local community and an innovative new business, we intend to convert all our solid waste and sewage sludge from this plant into steam power for use by the plant. Should this experiment prove feasible, we expect to save 180,000 gallons of fuel oil per year, essentially all of that plant's oil requirements. In addition, we may generate substantial amounts of electricity for our own use. Today, in accordance with State regulations, sewage sludge must be trucked at considerable expense to the Atlantic Ocean. If this experiment succeeds, we not only stop a part of the State's dumping into the Atlantic Ocean, but save ourselves money too. We are going to continue to explore alternatives to relate waste reduction to energy needs.

CONCLUSION

In closing, I should add that we have further opportunities to explore. Certainly, no effort is 100 percent successful. Even the best designed packaging and waste reduction system can result in materials which consumers, through careless habits, can use to produce litter. We want to work with the public to increase their level of concern for litter reduction, just as we seek to reduce our level of waste output. We have taken an active position to inform the consumer and discourage littering. We intend to continue to improve our efforts and to improve the consumer's efforts "to have it his way." We strongly believe that any corporate productivity program must have as a fundamental element both energy and material usage reductions, and they are interrelated.

RETREADING AND THE 100,000-MILE TIRE

W. James Sears*

Tires made in the United States are produced in 63 plants in 23 States by 17 companies. During 1975, the tire manufacturing industry employed 107,000 workers and had a sales volume of $4,600 million.

These companies produce many different kinds of tires. Automobile, truck and bus, motorcycle, construction equipment, farm tractor and implements, aircraft, industrial pneumatic, garden tractor, and bicycle.

In 1973, the last year for which complete statistics are available, a total of 249 million tires of all kinds were produced. Automotive tires for use on automobiles, trucks and buses, amounted to 233 million units or 90 percent of the total. Since automotive tires account for this large a share, I will deal only with them in my subsequent comments.

The doctoral dissertation authored by Robert R. Westerman under the title, The Management of Waste Passenger Car Tires, has been reviewed by members of our environment committee and others. He concludes that the best management of waste tires would be achieved by retreading and the production of a 100,000-mile tire. My remarks are confined to these two aspects. This week I have received a critical analysis of this dissertation prepared by Dr. Robert H. Snyder, Vice President for Tire Technology, Uniroyal Tire Company. Dr. Snyder points out several errors of fact, use of incorrect information, and the need to furnish correct information into the computer to develop a meaningful linear programming model. A copy of Dr. Snyder's critique will be furnished to the EPA.

All tires will some day end up on the scrap pile. For every new tire sold in the replacement market, one is removed from the wheel and discarded. Dependent upon its condition, the tire may find its way into a retread shop or to the scrap pile. Remember also that of the four or more tires on the 8 million or more automobiles and trucks scrapped each year, many never find their way into the stream of discarded tires. It has been estimated that as many as 200 million discarded tires become available each year. The accessibility and the methods and costs of collection are major problems. It is from this supply of discarded tires that retreaded tires are produced.

The retread industry has been in existence for over 60 years, and its current growth has been estimated at approximately 3 percent per year.

---

*Vice President, Rubber Manufacturers Association.

There are some 6,000 or more retread shops in the United States with an estimated capacity of some 50 to 60 million tires per annum. While accurate statistics are not available, it is estimated that 49 million automotive tires were retreaded last year—36 million automobile and 13 million truck, bus, and off-the-highway tires. The number of automobile tires retreaded represent about 20 percent, or one in five, of all the replacement tires sold in the United States. The number of truck, bus, and off-the-highway tires retreaded amounts to approximately 33 percent, or one in three, of all such tires sold for replacement purposes. Retreading extends the useful life of the tire casing, which is the structural body of the tire that is made of a variety of materials such as different synthetic fibers, fiberglass and, in recent years, steel wire. In this process, new tread rubber is vulcanized to a carefully prepared casing, permitting the casing to be put back into use with its replaced tread.

Before a used tire that has been discarded can be retreaded, it must be carefully and thoroughly inspected to determine whether it is suitable for retreading. Only 25 percent of the 200 million tires discarded in a year are retreaded. This is because not all discarded tires reach a point of inspection, and many of those that are inspected are rejected as unsuitable for retreading because of casing damage. One prominent retread specialist estimated that of every 100 automobile tires discarded, 60 are inspected and 30 of these are found suitable for retreading. For every 100 discarded truck and bus tires, 80 are examined and 50 are retreaded.

The new longer mileage automobile tires that have been introduced in the past few years face much greater exposure to cuts, punctures, and other road hazards because of their longer lives. Many truck tires may be retreaded more than once. It is not considered good, nor safe practice, to retread an automobile tire more than once.

Retreading is certainly not the complete answer to the scrap tire disposal problem, since the retread will some day be scrapped. However, at a given point in time, retreading does reduce the number of discarded tires that would otherwise go to the scrap pile. Retreaded tires will give many useful miles with the expenditure of less petroleum based materials than required for the production of a new tire. The retreading industry should be complimented for the improvement of their processing techniques and the performance of their product.

The industry today produces some 100,000-mile truck tires and three separate types of passenger car tires: the bias ply tire, the belted bias tire, and the radial ply tire. Within each of these three different constructions, dependent upon the kinds and quantities of materials used, tires giving considerably different mileages can be produced. Although there are wide variations in tire mileages, the following estimates indicate the national mileage averages at which tires wear out: bias tires, 20,000 miles; belted bias, 30,000 miles; and radial ply, 40,000 miles. The belted bias and radial tires have only been available on new cars and in the replacement market during the last few years. These mileage averages represent a considerable increase from those anticipated only a few years ago. There are known instances when tires of all three of these constructions have gone 100,000 miles before wear out. Top lines of radial ply tires now carry warranties by their manufacturers for 40,000 miles of tread life expectancy.

It is often assumed that treadwear is merely related to the abrasion resistance of the rubber tread. This is only one, and not the most important factor. The important factors are: (1) the transmission of forces during the changes in vehicle operation; (2) the vehicle suspension parameters, vertical spring rate, load distribution, and wheel positions; (3) load on the tire and the inflation pressures; (4) environmental conditions including road construction materials, temperatures, moisture, topography, and geography.

Surveys in all parts of the United States have been made to measure treadwear performance of tires in actual service. Such surveys have shown that in a given geographical area, the variability between the best and the worst wearing tires are greater than twofold. Such surveys have also disclosed that there is a twofold difference in treadwear between geographical areas. Thus, the vehicle that gets 20,000 miles of treadwear in Charlotte, North Carolina, would get 10,000 miles in Chicago, Illinois.

While there is no theoretical reason why the tire industry could not produce an automobile tire that would go 100,000 miles before wear out, the following are some reasons why such tires would be impractical. Generally speaking, anything that is done to improve treadwear performance, or the total number of miles that a tire operates, would be detrimental to the tire's performance in its life prior to wear out. Increasing the thickness of the tread to improve mileage would increase the fuel consumption required to roll the tires and adversely affect high speed capability. The traction performance of the tire would also be hurt in that the tread elements would be more flexible and therefore not grip the road as positively. The ride would also be affected in a detrimental way. The heavier tire with the thicker tread would not absorb the road irregularities as well as current tires. The damage to a casing that makes it unsuitable for retreading is related to the miles driven. The likelihood of road damage would be substantially increased with a 100,000-mile tire. Thus, substantial unused tread and an unrecovered investment would remain when it was removed from service due to injury. As far as tread compounds are concerned, the industry sees no new breakthrough or new materials in the foreseeable future. Generally speaking, to improve the treadwear performance of the tire, you hurt the tire's traction and consequently its safety capability. While there are compounds now available that could improve and, in some cases, substantially improve the treadwear characteristics of the tire, it would be too slippery or the traction would be so poor that it would be a detriment to highway safety.

When we discuss the mileage expectancy of an automobile tire, we must always remember that the tire is an integral component of the automobile. In this regard, the administrator of the National Highway Traffic Safety Administration 5 years ago told the appropriations committee:

> The pneumatic tire is probably the most complex component of an automobile. The tire is principally composed of textile fibers and various rubber compounds with several other chemical additives, extenders, and modifiers. When inflated with air, the tire must support the vehicle and transmit all steering, driving, and stopping forces from the vehicle to the roadway, while providing a comfortable ride to the passengers and durability at a reasonable cost to the consumer.

It is the automobile manufacturer that determines the power requirements of the vehicle, its acceleration, deceleration, braking requirements, the steering mechanism, the suspension parameters, the riding comfort, the stability, and handling requirements. It is the combination of these factors that dictate the design of the tire, including its tread life expectancy. If you could increase the size of a tire on a new automobile, add more rubber to the tire tread, beef up its casing and operate at much higher inflation pressures, you could substantially improve tread life such that a 100,000-mile expectancy would not be unreasonable. If this were initially designed for the Chicago, Illinois, area, then you could have a 60,000-mile tire in the Charlotte, North Carolina, area.

The new automobile equipped with these kinds of 100,000-mile tires would have performance standards unacceptable to the car design engineer and the motorist. It certainly would ride extremely hard, its stability and handling might be quite different, and it is likely that the automobile would fall apart before the tires reached the theoretical 100,000 miles. Today, the average automobile is scrapped after it runs 60,000 miles. Even today, the high quality radial tires will provide more miles than the lifetime of some of the vehicles. The beefed up 100,000-mile tire would require more materials, be of higher cost, and would not be a compatible component in today's automobile.

The radial tires produced by the industry are supplying approximately twice the mileage of the older constructions, and this has the tendency of reducing the unit demand for replacement tires. This factor, together with reduced auto production, has had a depressing effect upon the industry's financial operations. The production of a 100,000-mile tire, in our opinion, would not be an effective, economical, and certainly not the best management of waste tires.

As I indicated at the outset, our association's environmental committee has been dealing with the problem of scrap tire disposal. They recognize that the ideal solution should have no adverse effect on the environment, conserve natural resources by recovery and recycling raw materials, and have minimum adverse impact on established industries. Furthermore, the processes should have minimum costs and be capable of widespread use while the products produced should have commercial value.

In their review, the committee has found that there is no one single process by which all scrap tires could be utilized, but there are many processes that must be used to solve the problem.

Because of all of the ongoing work, it has been predicted that in a few years, scrap tires will not be considered a solid pollutant, but rather be recognized as a valuable raw material, which may be used as a fuel or processed into several useful products, relieving the inevitable strain on our natural resources.

Public Perspectives

VIEWS OF A CONSUMER

Arthur H. Purcell*

Speaking for the consumer is a rather immodest task, since we are all consumers, and all have our own consumer opinions and biases. But one "consumer" comes to mind who speaks for many of us. You may remember Inspector Clouseau, so aptly portrayed by Peter Sellers in "Shot in the Dark" and "Pink Panther." In a scene in one of those films, in response to a question about who he suspects has committed the crime, the good inspector looks around, flounders a bit, and says: "I suspect everyone. I suspect no one." If I may paraphrase our friend Clouseau: Today, consumers expect everything. They expect nothing. There is both profound disillusionment and great hope among consumers and in the consumer movement, as well as among those who watch consumer trends and who must deal with consumers. This disillusionment and hope bear directly on the question of how consumers figure in the waste reduction picture, or what Mr. Train has called the "War on Waste."

Let us look at some examples on the debit side—the disillusionment—that lead consumers to expect nothing, that lead consumers to feel that industry and government are not acting in their interest. First, in the food products area. As you well know, sugar prices have risen astronomically, and sugared product costs have gone up correspondingly. Yet, the major producers and retailers of comparable sugared and non-sugared products have generally hiked the prices of the sugar-free goods just as steeply as the sugared ones. This makes no sense from the consumer standpoint, and certainly reflects insensitivity towards the consumer. To add to the problem, there has been virtually no government action aimed at halting this discriminatory consumer product pricing practice. (I should note here that last week a friend of mine purchased some Neatsfoot oil, an oil that definitely doesn't come out of the ground. He asked the clerk why the price had tripled, and the reply was "Landsakes, boy. Haven't you been reading about what's happened to the price of oil?") In Washington, D.C., we have seen that a takeover of the food retailing business, to the point where about 70 percent of it is controlled by three giants (no pun intended), has led not to decreased prices, but to food prices about 14 percent higher than those in the rest of the nation.

I'll give you a very subjective example. You may remember that Shell Oil television ads used to have for a grand finale a big fat automobile crash through and tear to shreds, a life-size mural (if I'm not mistaken, it had trees on it!). This particular ad, to me, said: "Look, everybody, we like to waste, and isn't it cute?" So I wrote a letter to the president of Shell (I do things like that from time to time) saying that the ad offended me, and probably others, and that it showed a lot of contempt for our resources—in this case paper. I got a letter back that said, in essence: "You dummy, don't you know that a car crashing through a paper mural is our logo? People associated that with us. And it was only a very small piece of paper in relation to our annual tonnage. Besides, don't you know that paper is recyclable?"

---

*Assistant Professor, George Washington University.

Or how about that recent letter from Mr. Kendall, Chairman of PepsiCo, to Mr. Train where he basically told Mr. Train—in regard to the question of banning throwaway beverage containers—that what is good for the beverage and container industries is good for America. On his January 10 newscast, Edward P. Morgan said of this letter (which Kendall carbon copied, incidentally, to Gerald Ford and William Simon, among others): "As a document of a tycoon's arrogance to a public official, it could become a classic." Not too comforting for consumers who hope to effect change in waste habits by demonstrating to open-minded industrialists that they want to, and are willing to, work with them to reduce consumer product waste.

Consumers feel rather helpless, too, knowing that basic processing decisions affecting material usage in consumer products can only very indirectly be influenced by consumer habits. As brought out at the recent annual meeting of the American Institute of Mining, Metallurgical, and Petroleum Engineers, which focused on the subject of resource conservation in the materials and metals industries, many product manufacturing specifications are overly stringent and encourage materials and energy waste. But, rightly or wrongly, the consumer has little to say in this important area.

Those who observe consumer trends have also been disillusioned in some respects by consumer actions, as well as at times confused. Confusion, of course, arises out of the having-the-cake-and-eating-it-too approach of many consumers. For example, no consumer wants to pay for what he or she doesn't need and must throw away. This is perfectly consistent with the objectives of waste reduction. But now, particularly as more consumers are attempting, e.g., to use bicycles, public transportation, or just their own feet, the problem of literally lightening the burden of consumer products grows, and poses a conflict with the aims of waste reduction. After all, which weighs less, a throwaway aluminum can or a returnable glass bottle? Our consumer society prides itself on new lifestyles, greater freedom and mobility, etc. Are these conducive to waste reduction? No, they generally are not, and we can think of many examples that tell us why: from individually wrapped picnic items to throwaway cigarette lighters to second, third, and fourth overweight gas-guzzling family automobile.

Last year, consumer watcher disillusionment probably hit rock bottom. As soon as the Arab oil embargo was lifted, and former President Nixon assured us that the "energy crisis" was over, consumption of everything looked like it was going back to the old levels and beyond. Conservation and waste reduction were instantly old hat. Americans resumed practicing what Senator Goldwater described as their basic right to say "Fill 'er up!" But there is hope. There is significant hope because a conservation ethic somehow seems to be emerging.

Let's face it. The Ford and Nixon Administrations' economic game plans and ploys have given the drive for waste reduction great momentum; we're just too poor to consume and throw away things at the rate to which we were, until recently, accustomed. Statistics are showing that the solid waste stream is shrinking as the unemployment lines grow. But, I think that this reduction in waste reflects more than a tight economic situation. I think it may well be indicative of a genuine reduction of material wastes, just as we have managed to reduce our energy consumption. As consumers, we can take inspiration from the Federal Government which, in the past year and a half, has managed to cut its in-house energy expenditures by about [illegible] percent. Several leading industries have taken substantive conservation steps. (This has, interestingly, been documented by some of Senator Magnuson's staff people who compiled responses to a letter the Senator wrote to executives of America's 100 largest corporations asking, simply: "What have you done to conserve energy and resources?") At least one container manufacturer has stated a commitment to reduce material and energy usage in beverage containers by 1980 to the point where, according to his figures, the energy intensiveness, if not the materials intensiveness, of the containers will approach that of 10-trip returnable bottles. While this may not be satisfactory from the material waste reduction standpoint, remember that light cans can be regulated or banned, just as heavier ones. It was revealed last week that the country's balance of payments deficit reversed itself this past month, with the credit going mainly to reduction of oil imports, which also means reduction of materials usage. This is good news. And recent economic evidence indicates that, on an absolute cost basis, it is now cheaper to expand resource and energy productivity through conservation and waste reduction means than through the classical incremental expansion of energy and resource facilities.

Senator Percy's S. 200, the consumer protection act of 1975, promises that we may have a federal consumer agency one of these days. If properly set up, this agency could do a great deal to eliminate waste in consumer products.

Consumers are obviously in a formidable position in the question of waste reduction, since there is vast potential for waste reduction in the products made for them. The question now is: "How can consumers best go beyond their disillusionment, latch on to the hope that is emerging, and be an effective, positive force in helping realize the waste reduction potential?" This vital question—so easy to ask and so hard to answer—is one which Technical Information Project (or TIP), a group with which I have the opportunity to be associated, is taking a hard look at. TIP believes, as I certainly do, that consumers will have maximum input and impact only if they work together closely with other sectors of our society including environmentalists, labor, minorities, poverty groups, technologists, lawmakers—to implement strategies that are palatable to these diverse groups, and others, which figure so prominently in this national question. A striking example is one which permeates any serious discussion of the waste reduction issue. That is the problem of social costs of labor, industry, and other group dislocations accompanying significant waste reduction efforts. It is time that consumers sit down with their colleagues, really listen and try to grasp what the others have to say, and make a strong effort to go beyond the rhetoric and ill feelings, such as consumers and labor generally have over bottle bills, to work out a plan, or plans, which will be amenable to paying these social costs as well as swift implementation of waste reduction programs. Most assuredly, this is a tall order, but a necessary one.

To conclude, may I simply say that, while there is good cause for disillusionment, by the consumer as well as toward the consumer, there is even better cause for hope. We are all consumers. So let us neither underestimate our collective abilities to help conserve this country's natural resources, nor allow ourselves to underparticipate in the positive effort it will take to do so on a meaningful scale.

SOURCE REDUCTION
AN IMPORTANT PART OF A MATERIALS POLICY

Pat Taylor[*]

Thank you very much for this opportunity to share with you my views on the need for reduction in waste generation. Source reduction can and must play an important role in revitalizing our nation's materials use cycle—resulting in savings to municipalities and consumers as well as materials and energy.

Over the past 15 to 20 years, there has been a dramatic shift in per capita consumption of goods and materials. Consumers are now being offered increasingly large quantities of product packaging when compared with actual product consumed. For example, according to the EPA's Resource Recovery and Source Reduction, Second Report to Congress, "Overall, the consumption of food in the United States increased 2.3 percent by weight on a per capita basis between 1963 and 1971. During the same period, however, the tonnage of food packaging increased by an estimated 33.1 percent per capita, while the number of food packages increased by an estimated 18.5 percent per capita."

It is these trends which are of grave concern to environmentalists because of the attendant energy, resource, and solid waste impacts of present materials use patterns.

Briefly, I would like to examine some of the impacts of the United States' present energy and materials intensive economy on the work force, the consumer, and the environment.

In a statement before the Senate Interior Committee last year, Professor Nathaniel Wollman of the University of New Mexico addressed the implications of present materials and energy use patterns head on:

"Unless the total of materials use is reduced," he stated, "our environmental problems will continue to grow. By substituting labor for materials in certain strategic sectors of the economy, material throughput is reduced without a corresponding decline in the output of final goods. The increased labor needed for environmentally desirable or neutral products will come from the reduction in the pool of unemployed or partially employed labor."

A growing reliance on materials and energy for producing and delivering goods to the consumer has severely impacted the American worker. For all food and beverage shipments, the number of containers shipped increased from 78 billion units in 1967 to 103 billion units in 1972—a 32 percent increase. The value of these shipments rose 30 percent—from $84 billion to $110 billion in the same period. However, the work force declined in the beverage and food industries from 1.7 to 1.6 million employees despite the rapid rise in output. Production and sales in the food and beverage industries have become increasingly reliant on the substitution of materials and energy for labor.

---

[*] Environmental Action, Inc.

Another specific example of this phenomenon is in the brewing industry where job losses have been accompanied by a restructuring of the industry. In 1958, 71,700 people were employed in the brewing industry. By 1971, only 57,000 people were employed—a decrease of 20 percent in employment. Despite these job losses, in 1971, 11.1 billion more containers were shipped than in 1958.

Accompanying the decline in employment has been an accelerating trend toward concentration and dominance in the production and sale of beer in the United States. In 1959, 111 million barrels of beer were sold in the United States. The 10 leading brewers shared 55 percent of the market. Last year, 144 million barrels of beer were sold in the United States. The 10 leading brewers shared 81 percent of the market, with 6 breweries controlling 61 percent. By 1971, only 99 brewing plants remained in the United States, a substantial reduction from 400 in the early 1950s.

According to an article by Mr. Sanford Rose in the March 1974 issue of *Fortune* magazine, "The more complex an industrial society becomes, the more it learns how to organize electrical, mechanical or nuclear means of doing the work that men once did with hands."

It is this substitution of materials and energy for human labor that has stimulated consumer and environmental interest in the reduction of waste generation.

For consumers, it is especially critical. In testimony presented to the House Subcommittee on Monopolies and Commercial Law in July 1973, Ralph Nader and Beverley Moore stated, "The theoretical model of a free enterprise market economy assumes that advertising, packaging and other seller promotional information will provide consumers with accurate nutritional information. Consumers certainly have a right to expect to receive this information since they are paying $4 billion a year for food advertising costs that are included in food prices."

However, food packaging no longer merely protects a package and conveys to the consumer information on the nutritional value and costs of its contents—rather food packaging has become an integral part of the merchandising-advertising-packaging complex.

In a January 1974 article which appeared in *Nation*, Robert Choate discussed the impact of packaging as an advertising medium. "The food industry became convinced long ago that nutrition couldn't sell its products. The advertising agencies turned to toys, fantasy, sex appeal and hilarity to distract the food purchaser from worrying about the ingredients."

The cereal industry is probably a good example of what Mr. Choate is driving at. Between 1958 and 1970, cereal, flour, and related product consumption declined 8 percent, while package consumption increased 12.8 percent.

The food purchaser is concerned not only about ingredients but product cost and environmental impact as well. As a recent food page article in *The Washington Post* advised shoppers, "Read the net weight on the label; don't let appearances fool you. Often the package size bears little relationship to the contents." The article was advising consumers on how to save money while shopping.

In a survey conducted by a beverage industry firm, reported in the June 7, 1974, issue of *Beverage Industry*, consumers were interviewed about proposals to require deposits on all beverage containers. It was found, "Overwhelmingly, those interviewed said 'ban them from circulation by law' rather than increasing the cost of products to cover disposal costs or putting up with the pollution problems they cause."

This response cuts across all lines: education, occupation, union membership, marital status, and political affiliation.

How long does the consumer have to beware? How long must the public educate itself about the true costs of convenience packages?

Source reduction is a policy option which will have significant impact by reducing the amount of wastes generated, making possible savings in space at land disposal sites. This impact is of special importance to municipalities faced with limited lifetime at existing disposal sites. For municipalities transporting wastes for disposal any distance, transportation costs as well as land space savings will be achieved.

It is this benefit which prompted the National League of Cities and U.S. Conference of Mayors to recommend the adoption of national source reduction legislation. Their endorsement of national waste reduction policies stated, "The skyrocketing volume of solid waste is created by national economic forces that transcend local government. Unless we reduce the total volume of solid waste generated nationally, local governments will continue to be overburdened with the flow and financing of the nation's solid wastes."

Source reduction will also reduce the amount of wastes that need to be collected, thus making savings possible in collection costs, the most expensive part of local solid waste expenditure. The savings are contingent, however, on increased efficiency in collection procedures as a result of the decreased waste generation.

Sometimes resource recovery and source reduction are presented in the context of either/or. This is most unfortunate for, I would assume, most environmental organizations are not opposed to the recovery of materials from waste. Rather, it is our contention that both are important components of a balanced solid waste management strategy. What is simply frightening to us is the potential for institutionalizing waste generation through construction of resource recovery facilities dependent upon a steady stream of wastes that can and should be reduced.

Policies which have encouraged the rapidly expanding consumption of energy and raw materials must be reversed. We can no longer afford to ignore the broader implications of the solid waste disposal crisis facing cities across the country. It is a crisis of raw materials and energy management and policymaking that will affect the country for years to come.

For municipalities and waste collection agencies, the easiest problem to solve is one that you didn't create in the first place. That's what source reduction is really all about.

There is no one solution to the disposal crisis or materials and energy shortages. Explorations into the potential for energy recovery, increased materials recovery (through facilities construction and source separation), and source reduction have shown they all have a role to play in a balanced solution to the solid waste crisis.

IN THE DISTRICT OF COLUMBIA

William C. McKinney*

In all of my readings on the subject of waste reduction and disposal, I have failed to see any reference to the profound pronouncement of Omar Khayyam which neatly solves the problem; namely, "A loaf of bread, a jug of wine, and thou." I hasten to point out that this statement was couched in terms of unwrapped bread, a refillable jug for wine, and thou. Where is the waste disposal problem? The bread was unwrapped, the jug refillable from the cask at the winery, the only questionable item being thou. Unfortunately, technology and the demands of modern civilization have negated this simplistic approach to one of the major problems we face today in our current society. The health department has dictated that bread and other products will be properly packaged to protect them against contamination. The Internal Revenue Service mandates the non-reuse of the jug under the alcoholic beverage container laws of the country. Thou remains as the one unresolvable item.

I find it difficult as an employee of the District Government, dedicated to the service of its population, to present to you in categorical terms the considered public opinion on all facets of our waste reduction and disposal problems in the District. Let me hasten to assure you that it is a problem with which I deal on a day-by-day basis and for which we have found no single suitable solution. Last fall, the D.C. City Council considered proposed legislation to require a mandatory deposit on beverage containers. The legislative proposal was developed by a task force of the Metropolitan Washington Council of Governments and included representatives from the District of Columbia. The proposal was predicated on a requirement for a 5-cent deposit on all beverage containers, refillable and otherwise, to be instituted by all jurisdictions within the Washington Metropolitan Area. It was recognized that such a proposal would have to apply within the several jurisdictions in order to be meaningful and enforceable.

It was one of the best attended public hearings which had been held by the City Council in a long time, indicating a depth of interest unusual in legislative proposals under consideration by the council. The position taken by the Department of Environmental Services was a tempered one based in large measure on our inability to anticipate the total impact of the legislation on the District. We did not feel that the experiences in the two States of Oregon and Vermont were translatable into the urban situation which prevails in the District of Columbia. Our reservations were based on the potential health hazards incident to the storage of used beverage containers in households, food establishments, and other facilities where such containers would be stored for varying periods of time pending return to the supplier. There is evidence that would indicate that the problems of rodent and vermin control in such areas would be exacerbated further by the usual lack of adequate storage capacity for handling such containers in the establishments in question. We recognize the fact that such legislation would probably encourage the use of refillable containers. However, this is not an unmixed blessing due to the capital investment which would be required for the installation of necessary washing and sterilizing equipment to permit the reuse of such containers coupled with the increased hazards associated with the possible improper cleaning and disinfection of containers prior to refilling.

---

*Director, Department of Environmental Services, Government of the District of Columbia.

In summary, the arguments pro and con on the legislative proposal did not lend themselves to a categorical conclusion as to the benefits of the bill from the public viewpoint. The arguments that the use of refillable containers would result in a reduced cost of beverage to the user was countered by arguments that the increased difficulties of handling, storage, and return would result in the need for increased transport and labor costs with an actual increase in the cost of the beverage to the consumer. It was argued by some that legislation would effect a substantial reduction in litter. The studies by this department indicate that only 40 percent of the litter (by count) consisted of beverage containers. We do not anticipate any real saving to the department in dealing with the problem of litter through this somewhat modest reduction in quantity. The counter arguments on health and safety pointed out the benefits associated with the elimination of nonreturnable beverage containers because of the avoidance of cuts and other injuries resulting from their use. There were other arguments presented as it related to its impact on retailers, actual resources, energy savings, impact on jobs. Suffice it to say that the legislative proposal was approved by the council and subsequently vetoed by the mayor. Similar legislation has been recently reintroduced before our newly elected City Council and will be up for further hearings. In addition, the jurisdictions within the Metropolitan Area are reexamining their position on this matter. The city of Bowie has recently been upheld by the courts to the effect that their bottle legislation is legal and enforceable.

The final outcome on container legislation within the Metropolitan Area remains to be determined. I can assure you that the problem of waste collection and disposal, litter, and the general problem of a clean environment is one of the foremost issues in the District of Columbia. In my opinion, no single piece of legislation will solve the problem. We will never have the dollars to deal with the problem on a unilateral basis, particularly litter, unless we generate the wholehearted support and cooperation of the public in preventing litter at its point of origin. The new litter containers which you no doubt have seen on the streets of our city represent one step in the development of a litter control program. The innovative approach here was developed by a nonprofit organization, Pride Environmental Services, Inc., which, through the sale of advertising space on the sides of the containers, has been able to generate revenue sufficient to cover the cost of the containers with some additional financial return to the organization. It has relieved the city of the financial obligation to find funds for the placement of some 10,000 litter containers throughout the city.

We are in the process of implementing a "Clean City Program" which has been funded at a level of $1.2 million a year. This program is dedicated to the overall improvement of environmental conditions within the city with particular reference to the litter, trash, refuse problems with which we deal. We are structuring the program on a three-pronged approach; namely, (1) the institution of an expanded street and alley cleaning program dedicated to the cleanliness of public space generally throughout the city; (2) the establishment of a surveillance program in order to monitor the city on a day-by-day basis to identify those areas where problems are developing and to take necessary action, including legal action, against the violators of our litter and refuse regulations in the District when necessary; (3) the establishment of a community-wide committee involving representation from residents, neighborhood groups, business and commercial interests, governmental agencies, and others dedicated to cleaning up our city and keeping it clean. I shall be most happy if we can convince the residents to properly containerize their waste in order that it can be properly collected and disposed of by both the municipal and private collection systems operating within the city.

I am convinced that legislative enactments, regardless of how well founded they may be, which place responsibility on the individual will never succeed unless the individual is motivated. Our task hopefully is to change the point of view of the residents and tourists to our city regarding the need for proper litter and refuse disposal. Further, I am convinced that the future of waste reduction in the District will be in the field of recycling and resource recovery. From an economic point of view, this can be best carried out on a city-wide basis rather than trying to impose requirements on individual residents for separation, storage, and disposal of various components of the waste stream. I believe that this position is not in conflict with container legislation which would divert the beverage containers from the solid waste stream of the city. The reduction of steel, glass, and aluminum in the stream will not significantly impact the economics of a resource recovery facility. Based on available data, the maximum effect of such a requirement would result in a 10 percent reduction in aluminum wastes, 15 percent reduction in glass wastes, and a 15 percent reduction in ferrous wastes. The economics of most resource recovery plants depend primarily on the revenue derived from the sale of refuse-derived fuel (RDF), estimated at $10 to $15 per ton of waste processed. Loss of revenue from the beverage container fraction would amount to some $1 to $2 per ton of waste processed based on the national average quantities of aluminum, glass, and steel in the waste stream.

It is entirely possible that the need for facilities to recover glass and aluminum could be deferred pending better definition of their removal technology. In any event, we would need to evaluate the impact of beverage container legislation on recycling levels which may be much higher (70 percent) than anticipated.

The budget request for the Department of Environmental Services recently submitted to the City Council for fiscal year 1976 provides for the institution of two major projects directed toward the creation of resource recovery facilities within the District. We are proposing a pilot project to be located at our Solid Waste Reduction Center No. 1 designed primarily for the production of refuse-derived fuel for use as a supplementary fuel at the Potomac Electric Power generating plant at Benning Road. These two facilities are located in immediate proximity to each other, and the processed fuel will be delivered to the powerplant through a pneumatic system designed to produce approximately 170 tons of fuel per day. The budget request also contains funds in the amount of $9.6 million for the construction of a resource recovery facility at our sanitary landfill operation at Lorton, Virginia. This plant would be designed to handle 650 tons of refuse per day and would provide not only for the production of refuse-derived fuel but also the recovery of steel and possibly aluminum, glass, and other reusable components in the waste stream. The nonusable residue amounting to approximately 15 percent by weight of the total waste would be disposed of at the sanitary landfill.

In my opinion, this represents the best approach based on current technology. I do not feel that alternate methods of disposal such as pyrolysis have been developed at this time to the point where they would constitute a suitable alternative to the recycling facility of the type I have described. Technological developments over the next several years may prove me wrong.

In closing, we in the Department of Environmental Services have been deeply appreciative of the help and assistance given by the Office of Solid Waste Management Programs of the Environmental Protection Agency in the overall field of solid waste management. There are only one or two points I would like to make in passing, and I hope they will be accepted in a constructive sense. I would plead for a more complete systems analysis dealing with all facets of a given problem in the solid waste handling and disposal field as opposed to the concentration on individual facets of the problem. Also, I am always overwhelmed by the national figures and the billions of tons of this and the billions of dollars expended. I have trouble relating these types of data to the situation within the District.

Also, it doesn't take five pages of dissertation to prove the point that if there is less waste there will be lowered disposal costs. Finally, please give a little more attention to the sociological factors that are involved in developing recommended approaches to the problem. I am confused by a statement that says, "Many activities by their nature create important environmental disamenities that cannot be adequately internalized and controlled." Tell me, in simple terms, how I can get the public to cooperate in dealing with the massive problems we face in this field of solid waste collection and disposal.

VIEW OF THE LEAGUE OF WOMEN VOTERS

Dana Duxbury*

I would like to thank the Environmental Protection Agency for this opportunity to present the League's views on waste reduction. As you may know, the League of Women Voters of the United States is a volunteer citizens organization of 1,300 local leagues with approximately 140,000 members in the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands.

The deep concern of league members across the country over our ever-burgeoning problem of solid waste disposal and its pollution effects caused them to decide, in 1971, to give special attention to solid waste management in their national environmental work. And so local leagues across the country studied solid waste management and resource recovery for 2 years. Our study made us aware of America's greedy consumption habits. The "good life" leaves much flotsam and jetsam in its wake. We were overwhelmed with the vastness of our nation's wastes and the problems our communities face because of their seemingly endless piles of refuse.

League members across the country studied and observed local solid waste disposal practices. We saw the heavy burden our ever-growing tonnages of refuse place on the local property taxpayer and the local officials, who in many communities are technically and financially ill-equipped. They cannot cope now. Why should we place on them the strain of more unnecessary wastes? And why should they have to bear the economic burden of extra wastes? So many local landfills, even if we grace them with that name, are full. So many landfills are causing serious leachate problems. So many incinerators are faulty, improperly operated, or unable to meet air pollution standards. We have seen such strong local opposition to the siting of new disposal facilities and less and less environmentally suited land available for land disposal.

As for resource recovery, we firmly support it, but we realize that it will only be economically feasible in areas of high population density which do not have much cheaper disposal options.

The League of Women Voters seeks to inform the public as well as our own members about the issues with which we are concerned. In 1971 we brought out an introductory publication on solid waste collection and disposal and the general problems of solid waste management. In 1972 we published a pamphlet, *Recycle*, covering all we had learned on the need for and the obstacles to reuse, recycling, and reclamation. And now, because our members believe that the American people must cut back on the amount of waste we generate, the League is about to publish a timely booklet called *Reduce*, which will explain the reasons for source reduction of solid waste.

---

*Committee on Environmental Programs and Projects, League of Women Voters of the United States.

We believe that industry has created and citizens have allowed a situation to develop in which we now have many less durable goods, many new throwaway items, enormous numbers of excessively wrapped packages, and many containers which are now treated as disposable. It has often been said that citizens demanded and welcomed what some have called "convenience" packaging, but which we might prefer to call "nuisance" packaging. We believe that citizens have been mesmerized into believing that these changes are desirable. We are sure though that people are becoming more and more aware of the excess costs they must now pay for such items and the drain they place on our resource and energy use.

We hope that industry will reconsider its present trends. Surely it's what's inside the package that counts. Admittedly packaging is a necessity, but it is also a luxury. Creating waste should not be our goal. Reusability and longer product life certainly are both sensible goals—ones which we think consumers value especially today when their disposable incomes have shrunk.

We think that source reduction will not cancel out energy recovery from solid waste. The U.S. EPA has estimated that there are a total of 492 trillion Btu in the waste stream. With the reduction of a possible 82 trillion Btu through source reduction measures, we believe that energy recovery would not be seriously altered. Although we have supported in the past Federally funded sewage treatment plants, our observations of these programs leave us less than enthusiastic about Federally funded resource recovery facilities. But no matter where the operating and capital costs come from, private or Federal, State or local, why should the taxpayer be expected to pay for unnecessarily large disposal facilities and extra collection and resource recovery costs arising from uncontrolled industrial practices?

League members have grown concerned about our rapid rate of nonrenewable resource depletion and our overuse of our renewable resources. They concluded that this country should forestall this depletion. We have long opposed the environmental degradation that our mining and other raw material extraction processes have caused. What a senseless land-use policy to rapidly strip resources from their natural areas and dump the residuals from mining and processing onto the land or into the air or water somewhere else when we need *not* have extracted the virgin materials at all and when their extraction, processing, and transportation require so much energy consumption! Our members are strongly pressing for resource recovery, for adoption of energy conservation measures by government, industry and citizens, and for reduction of waste at its source. We believe waste reduction is an important place for us to begin to slow our profligate energy use.

The areas we consider potential candidates for source reduction include: (1) durable goods such as appliances and tires; (2) nondurable goods such as disposable paper products; (3) throwaway containers and excess packaging.

The league believes that Government should establish policies and programs to reduce the generation of solid waste. Through testimony on specific bills, the League of Women Voters of the United States has encouraged the Congress to recognize the importance of source reduction and to set product regulations and standards that will help to bring about waste reduction. Many local and State leagues and the national league have testified in support of returnable beverage containers.

We believe that the Federal Government must assume the responsibility of forcing citizens, industry, and itself to evaluate those things which are placing a needless burden on the present and disregarding our needs in the future.

We appreciate that any changes in our society may have both positive and negative effects. We believe, however, that the benefits of source reduction greatly outweigh the drawbacks. Unemployment from reduction in nonreturnable containers must be mitigated of course by job retraining, phasing in programs, and other measures supportive of those who must seek other work.

We all know that any changes that industry itself institutes often have drastic effects on production, jobs, and plant locations. We feel it is unfair of industry to ask citizens to maintain the status quo when their own decisions at times have had the same "negative effects" they say would be caused by source reduction.

In a way, the energy and economic crises may have been a slight blessing to this country, for they have forced us, as no concerns or claims by a *few* citizens could have done, to examine the *collective* impacts of our patterns of consumption. Planning, saving, and changing our voracious energy and resource use will in the long run benefit us all.

APPROACHES TO SOURCE REDUCTION

Karen A. Wendt*

People from Minnesota are fond of quoting a speech which Chief Seattle, leader of a tribe in the Washington territory, delivered in 1854 to mark the transferral of Indian lands to the Federal Government. The prophetic words of Chief Seattle deal directly with what I call the frontier mentality of American society:

> We know that the white man does not understand our ways. One portion of land is the same to him as the next, for he is a stranger who comes in the night and takes from the land whatever he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his father's graves behind, and he does not care. He kidnaps the earth from his children. He does not care. His father's graves and his children's birthright are forgotten. He treats his mother, the earth, and his brother, the sky, as things to be bought, plundered, sold like sheep or bright beads. His appetite will devour the earth and leave behind only a desert.[†]

Chief Seattle refers to the geographic frontier mentality prevalent in his day. When land resources became depleted or scarce on the eastern seaboard, people moved West. When the geographical frontier closed in the 1890s, another frontier replaced it—expectations of higher standard of living based on overconsumption of resources. Today the United States consumes resources at a rate that far exceeds that of the rest of the world. To use paper as an example, the United States consumes 639 pounds/capita/year which is 36.5 percent more than the next closest consumer, Sweden. Canada consumes even less than Sweden (Table 1). But is the quality of life in those countries substantively different than that of the United States?

One of the alleged indicators of a country's standard of living is the number of choices the consumer has at the supermarket. Oftentimes the argument in favor of increasing the amount of product choice to

---

*Research Scientist, Minnesota Pollution Control Agency.

[†] Chief Seattle, leader of the Suquamish tribe in the Washington territory. Speech delivered transferring Indian lands to the Federal Government (William Arrowsmith, translator), 1854.

TABLE 1

POUNDS OF PAPER CONSUMED PER CAPITA PER YEAR[*]

Country	Pounds per capita per year
United States	639
Sweden	468
Canada	451
United Kingdom	301
Federal Republic of Germany	299
Soviet Union	67
People's Republic of China	18
Kenya	13
Niger	.22
Mali	.44

[*] Pulp and Paper International Review. San Francisco, Miller Freeman Publishers, July 25, 1973.

consumers is advanced in dramatic tones, as though profligate consumption was a God-given right, or at the very least, one supplied by the U.S. Constitution. It is doubtful that any rational person would argue that the standard of living in the United States had significantly increased in the last 9 years, but yet the number of items carried by the average supermarket has increased by 25 percent since 1964 and by nearly 70 percent since 1950 (Table 2). We have also seen a proliferation of frivolous products foisted upon the American consumer in recent years. For example, hair coloring products represent a 282 percent increase in size and brand selection in the last 4 years. Stomach relief preparations increased by 201.5 percent during the same time and female antiseptics-deodorants increased in size and brand selection by 250 percent (Table 3). While we agree that consumers are entitled to some product choice, it is not clear that the wide array available today has either increased our quality of life or made us a more contented population.

John Kyl, Assistant Secretary of the Interior, has stated that the United States is headed for a materials shortage which will make the energy crisis look like a "Sunday school picnic" and predicted that it would occur by 1975.[*] Just as we realized in the 1890s that the geographic frontier had closed, so are we now beginning to realize that the mineral and energy frontier is rapidly closing too.

What can we do to preserve these rapidly diminishing material and energy resources? In Minnesota, source reduction--or waste reduction--is our most important goal. That is, we try to reduce the generation of

---

[*] St. Paul Pioneer Press, Sept. 30, 1974.

TABLE 2

NUMBER OF ITEMS CARRIED BY THE AVERAGE SUPERMARKET*

Year	Number of Items
1950	3,470
1960	5,100
1964	5,950
1968	6,925
1970	7,300
1972	7,775
1973	7,950

*41st annual report of the grocery industry. *Progressive Grocer (Western Edition)*, 53(4):153, Apr. 1974.

TABLE 3

ASSORTMENT OF SELECTED PRODUCTS AVAILABLE IN SIZES/BRANDS AT WAREHOUSE*

Products	1973	1972	1971	1970
Spray deodorants and antiperspirants	61	65	56	48
Female antiseptics/deodorants	30	21	15	10
Hair coloring products	149	85	47	30
Pain relief	90	71	50	45
Stomach relief	94	63	41	26
Cold symptom relief	102	63	44	18

*Chain Store Age, Super Markets (Stores Edition), 50(7):165, 170, 172, July 1974; 49(7):169, 177-178, July 1973; 48(7):196, 202, 205, July 1972; 47(7):190, 192, 199, July 1971.

solid waste through a reduction in the consumption of materials and products. Basically there are four major goals of source reduction: (1) reuse containers rather than immediately disposing of them; (2) reduce the consumption of energy and materials per product; (3) extend product lifetime; (4) decrease product consumption.

Government can achieve these source reduction goals through two avenues: regulation and public education. First I'd like to discuss those regulatory approaches government might undertake, then move to a discussion of the feasibility of public education in this area and, lastly, talk about a few things the consumer might do to reduce consumption.

The regulatory approach that has gotten most of the attention from environmentalists as well as industry has been beverage container legislation of various types. Bills which have been geared toward reducing the proliferation of throwaway beverage containers have been introduced in most State legislatures, many municipalities, and the U.S. Congress over a period of several years. According to Barry Commoner, the highest postwar growth rate has been in the production of nonreturnable soda bottles—an increase of 53,000 percent.[*]

These throwaways were created in large part to provide a "convenience" to the consumer; however, consumers are not informed through advertising of the true costs to them. Instead, they are subjected to advertising which promotes the consumption of throwaway beverage containers because they are recyclable. These kinds of advertising and public relations campaigns, involving hundreds of thousands of dollars and the most sophisticated mind manipulating techniques, are designed to create widespread public acceptance of wasteful throwaway containers on the grounds that they are recyclable and therefore "good" for the environment. It makes little sense, however, to toss diamonds into the front end of the solid waste stream, so that diamonds can be recovered at the other end. After an intensive nationwide advertising campaign to create consumer enthusiasm for recycling aluminum cans—80 percent of all aluminum cans produced are used for beverage containers[†]—aluminum industry figures show that 16 percent of these cans are being recycled.[‡] Where are the other 84 percent of these "aluminum diamonds"?

---

[*] Udall, S., C.N. Conconi, and D.B. Osterhout. The great energy joyride. The Progressive, 38(11):43, Nov. 1974.

[†] Bingham, T.H., et al. (Research Triangle Institute). An evaluation of the effectiveness and costs of regulatory and fiscal policy instruments on product packaging. Environmental Protection Publication SW-74c. (Washington), U.S. Environmental Protection Agency, 1974. p. 52.

[‡] Taylor, P. Debunking Madison Avenue. Environmental Action, 6(15):6, Dec. 18, 1974.

Unfortunately, there are only two States and a handful of municipalities throughout the country that have enacted bottle bills to date. Russell Train, EPA Administrator, delivered a speech in San Francisco before the Third National Congress on Waste Management Technology and Resource Recovery in which he explained part of the reason for this dismal failure to take care of one of the fastest growing segments of the municipal solid waste stream:

> I am not surprised that those engaged in the manufacture of certain of the containers would oppose attempts to place restrictions on the use of nonreturnable beverage containers, but the broad-scale corporate concern about the nonreturnable container makes me suspect that, symbolically, this issue touches on nerves that are still sensitive to the currents of yesterday when, willingly or not, we embraced the illogical notion that waste makes wealth.*

A regulatory approach that was adopted by the Minnesota Legislature in 1973 gave the Minnesota Pollution Control Agency the authority to regulate new or revised packages based on environmental impact. Since packaging accounts for 14 percent of the municipal solid waste stream and in 1971 accounted for 47 percent of all paper production, 14 percent of aluminum production, 75 percent of glass production, 8 percent of steel production and approximately 29 percent of plastic production, we believe that Russell Train is correct when he said—again from the San Francisco speech:

> . . . if packaging growth continues in the next two decades at the same rate and using the same virgin resources as it has in the past two decades, we will soon have nothing to put into the packages.†

The Minnesota statute called for the Minnesota Pollution Control Agency to develop regulations for packaging review. Toward that end, the staff of the Agency conducted nearly a 3-year series of meetings with industry groups and environmentalists and held an unprecedented series of three public hearings on the issue. We have not yet reviewed or prohibited any packages; however, I would venture to say that there has been some positive effect on Minnesota's solid waste stream simply because we have the regulatory authority. We suspect, for example, that certain products have been kept out of the Minnesota market—whether for test marketing purposes or as permanent retail items. Also, the series of formal meetings and informal contacts with industry during the writing of the regulations had a positive impact. Those industries which had not considered the environment in designing their packages previously became aware of another parameter to consider during the package design process.

---

*Train, R. E. Win the war on waste. Presented at 3d National Congress on Waste Management Technology and Resource Recovery, San Francisco, Nov. 14, 1974. p. 7.

†Train, Win the war, p. 8.

We at the Minnesota Pollution Control Agency believe that both of the previously discussed regulatory approaches—beverage container regulation and packaging regulation—should be national in scope. However, we are also convinced that we will never see national legislation in either of these two areas until more States develop packaging regulations and more municipalities and States join Oregon and Vermont on beverage container regulation. Both of these regulatory approaches need some industry support for passage at the national level, and we believe that industry would vigorously lobby for national bills in both of these areas if they were faced with differing regulations in five to seven large States. We therefore encourage other States to join the three source reduction States in these two areas.

There are several other source reduction measures which could be implemented on either a State or local level at this time. Some of these would include promoting the establishment and operation of successfully managed food and other consumer cooperatives. This would reduce product packaging and would also provide substantial savings to the budget-conscious shopper.

Regulatory and economic mechanisms to encourage a return to the use of refillable and standardized containers in some instances should be explored. This would also be done best on a national level; however, the impetus in this area would no doubt have to come from several States first. We believe that items such as pickle jars, mayonnaise jars, peanut butter jars, and ketchup bottles to name just a few could be reused. Provide an economic incentive—such as a deposit—to the consumer to guarantee the return of these glass containers, and they could be reused simply by replacing a paper label.

Another State and/or local approach to source reduction involves the actual collection of solid waste. Here we would suggest two things. Collection costs should be tied to the actual amount of trash generated in the household. Since magnetic separation of refuse is costly during the recycling process, it is also suggested that communities experiment with having a voluntary source separation program whereby those householders who were willing to separate their trash would pay less for collection than those who were not willing to do so. Both of these schemes would make the consumer more conscious of what was being discarded by forcing him to take a look at his own garbage.

There are three other areas in which we believe regulation could help achieve some source reduction goals. These all deal with the extension of product lifetime. The product warranty system should be expanded and improved to guarantee all product repairs—from breakage during normal use—for the total lifetime of the product as an incentive to manufacturers to build more durable products. There might be legislation passed to provide disincentives—in the form of taxes—to manufacturers of short-lived products or disposable products such as disposable lighters, disposable razors, disposable diapers, etc. The third suggestion is to provide incentives to the repair industry to make it easier for consumers to get items repaired. It is a sad commentary on a society which makes it cheaper for a consumer to go out and purchase a new lamp, for example, instead of repairing a minor problem on the old one. Yet today this happens all too often.

I'd like to take a few brief moments now to discuss what government and environmental groups might accomplish through public education. Let's consider a few questions: Does the consumer make rational choices in product selection? What has caused the consumer to believe he needs convenience items? What has caused the current throwaway mentality? We suspect that industry advertising has made a significant impact on consumer habits. Advertising has the potential for creating a demand for a product the consumer never realized he "needed." As an example of this thesis, consider the case of the "fruit ripening bowl." Ludicrous as an electric bowl to ripen fruit sounds, a considerable consumer demand could be generated through an advertising campaign. However, before the advent of such a product and advertising campaign, the very consumers who would rush out to purchase this particular product would have given no thought to an electric fruit ripener. We believe the approach of creating an unnecessary product, followed by an intensive advertising campaign to create consumer demand for it, happens all too frequently in the real world. We therefore believe that public education in the area of source reduction is an effective measure to take toward achieving the goal of retarding the growth of the municipal solid waste stream. Industry has proven that consumers will respond to advertising; therefore, it is our belief that consumers will also respond to environmental public education programs. In most instances source reduction measures coincide with consumer savings. These savings should be pointed out to the consumer along with the benefits to the environment. Industry spends hundreds of thousands of dollars per year to induce consumption, yet enlightened governments and environmentalists have little money to counteract this message. We must begin now to do whatever we can to bring the facts to consumers regarding the environmental and economic consequences of their purchases.

What should we as consumers do in our everyday lives to reduce consumption?

If you don't need it, don't buy it.
If you do need it, select a brand that is of high quality and durable.
If it breaks, get it repaired rather than disposing of it.
If you no longer need the item, give it to a friend or charitable organization rather than disposing of it.

The major problem to be tackled is to slow down growth and development—the too rapid consumption of both energy and resources. This does not mean we at the Minnesota Pollution Control Agency are against all growth and development. We have borrowed the motto of the Pacific Northwest Chapter of the Sierra Club: "Not blind opposition to progress, but opposition to blind progress."

While source reduction programs may result in a small shift in the economy due to reduced consumption of material and energy resources, the shift is gradual. If there is a considerable delay in the implementation of source reduction programs and the predicted resource crisis occurs, the shift will be much more dramatic and rapid and will be accompanied by parallel dislocations in other areas of the economy so that the impacts will be unnecessarily severe. Again quoting from Chief Seattle: "Continue to contaminate your bed, and you will one night suffocate in your own waste. . . This we know. The earth does not belong to man; man belongs to the earth. This we know. All things are connected like the blood which unites one family. All things are connected."[9]

---

[9] Chief Seattle, Speech, 1854.

[illegible]

[illegible]

[illegible]

[illegible] technical [illegible] is intended

[illegible]

Through resource recovery techniques it is possible to reduce waste disposed of on the land by [illegible] percent. However, this would apply to waste in specific locations; nationally the practical limit of resource recovery is no more than 20 to 25 percent of the total waste stream. Obviously applying both approaches would have a greater impact on the waste stream than applying only one.

TECHNICAL OPTIONS FOR SOURCE REDUCTION

1. Redesign products so they require less material but perform the same function. This is the forte of industry, where "competitive" technology shines. The options are many and you will be told about a number of the innovations in product design in the course of this conference. A few examples are: a new package sealing technique and interlock for a carton; a new package shape that increases integrity of the product while using less material; and elimination of unnecessary reinforcement in a product or package. There is a 15 to 20 percent reduction potential for most manufactured products.

2. Substitute one material for another. Make a part or product from a different material to reduce its bulk, improve shape, function, etc.

3. Package for consumer use patterns. Make small sizes for some uses and bulk sizes for families through product redesign.

These first three practices take place in the course of "normal" competition within industries.

4. Design products for durability, repairability, and reusability. A product may take more materials per unit initially, or more expensive materials, or modular design, but extending the useful life of the product will lead ultimately to less waste.

If we get more mileage out of the product, then we achieve a reduction of the flow of materials into the waste stream over a period of time. This is where we talk in terms of "reusable" versus "disposable" products. The afternoon will be spent talking about refillable beverage containers versus nonrefillable beverage containers, which has become the classic example. There's also interest in the use of cloth towels versus paper towels, glass tumblers versus paper or plastic cups, and other reusable options. There are other issues involved besides waste reduction, however, including sanitation, health, and of course the basic economics of the various alternatives. Waste reduction is not going to be the obvious first priority in many cases.

All of these options have the objective of reducing materials use: some do it painlessly, some do it by eliminating consumption habits. Finally, the ultimate in waste reduction might be to find some way to deliver goods but drastically reduce the materials requirements for so doing. For example, it might be possible through technical innovation to do away with the printed newspaper delivered to the home but not with the news provided by that source. One option would be to completely change the nature of the product so that the newspaper is displayed on a television set and a person could scan the pages using a remote control on his own set—to read the want ads, news, comics, etc., all without the use of 10 million tons of newsprint every year (which, incidentally, is "instantaneous" waste because of the short life of the paper). This is an improbable development for the near future but it could happen, without losing freedom of the press. This is just one "far out" waste reduction option that would make us a less materials-intensive society.

RESOURCE RECOVERY

At the other end of the system, it is possible to prevent entry of material into a disposal site or the waste stream rather than avoiding utilization of the material or the product to begin with. This measure basically boils down to reducing the flow of virgin materials into the waste stream. There are two options here: (1) recycling of materials, or (2) resource recovery, which is a broader term that includes recycling.

There's a good deal of technical capability and technical advancement needed in this field, but there's also a good deal that has taken place. About 35 percent of the municipal solid waste stream is amenable to recycling today, including roughly 9 percent metals, 9 percent glass, and 17 percent paper. Of course, this 35 percent is before considerations of recovery efficiency, the geographic scope, and market considerations.

On the other hand, resource recovery in the broad definition could recover about [illegible] percent of the total municipal solid waste stream if all the organics were converted to some usable form such as fuel, compost, or other products. There's new resource recovery technology coming, there's new technology already developed, and there's technology already in place. In fact, there's a good deal of work being sponsored by both the Federal Government and private industry.

The need today in this whole technical area of waste reduction is to recognize two or three key issues. One is that, as one of the speakers said yesterday, we need to approach the subject on a systems analysis basis considering both the resource and environmental consequences of any actions. Second, we need to bring into that consideration the economic costs and benefits of taking any particular action. Third, we need to address health and safety aspects of any waste reduction measures. A good deal more of our technology or technological prowess should be devoted to waste reduction. This last point is probably the basic message being delivered here, and that has been delivered at past conferences and discussions by industry and the public. Both source reduction and resource recovery require the application of our technological capabilities to achieve the objectives of resource conservation, environmental improvement, and waste reduction.

BIBLIOGRAPHY

Franklin, W.E., et al. [Midwest Research Institute]. Base line forecasts of resource recovery, 1972 to 1990. Washington, U.S. Environmental Protection Agency, Office of Solid Waste Management Programs, Resource Recovery Division, Mar. 1975. 376 p. (Unpublished report.)

Hunt, R.G., et al. [Midwest Research Institute]. Resource and environment profile analysis of nine beverage container alternatives; final report. v. 1-2. Environmental Protection Publication SW-91c. Washington, U.S. Environmental Protection Agency, 1974. 176 p.

Smith, F.A. Technical possibilities for solid waste reduction and resource recovery: prospects to 1985. Washington, U.S. Environmental Protection Agency, Office of Solid Waste Management Programs, Resource Recovery Division, Dec. 10, 1974. 18 p. (Unpublished report.)

PACKAGING SYSTEMS REQUIREMENTS

Howard Cannon*

In the last 150 years, packaged food has become the backbone of our food preservation and food distribution system since it offers a unique combination of long storage life, retention of original texture and flavor, convenience, and low cost.

Originally metal and glass containers were handmade, expensive, and not too reliable. In the last 50 years, great progress has been made in reducing the weight of containers and in automating their production, filling, and sealing. With automation, the requirements imposed on the can have become much more complex. Today, any packaging system, whether based on metal, glass, plastic, fiberboard or combination, must meet, at least in part, the following requirements for processed food: (1) use of low-cost materials; (2) rapid manufacture of containers; (3) ease of handling empty containers; (4) rapid filling; (5) perfect gas-tight sealing 9,999 times out of 10,000; (6) resistance to sealing forces; (7) capable of being heated to about 250 F; (8) introduces no flavor, odors, colors or poisons to the food product; (9) resistance to corrosion induced by product; (10) resistance to shipping abuse; (11) outer appearance appealing to customers; (12) shelf life of 1 to 3 years; (13) retain foods' natural texture and flavor; (14) easy to open; (15) convenient to dispose of.

These requirements are not easy to meet in a packaging system. Frequently long and complex efforts involving specialists from many areas and usually requiring test packing, which may take 6 months to 3 years to actually prove that the selected specification is satisfactory in all aspects for the intended use, are necessary. I stress these practicalities of container selection and the many requirements which must be met to emphasize that accommodation to the increased importance of pollution control, reuse or recycling, and reduced material use is not a simple or quick task.

I believe great strides are being made to meet these new requirements while still optimizing as much as possible the other requirements in the previous list. However, typically it takes 5 to 7 years from the initial concept of a major change in packaging until it is commercialized. Since packaging is a highly competitive business, packaging companies do not announce their new developments until they are fully ready for commercialization. Consequently the outside world usually isn't aware of developments underway. These new requirements represent new opportunities and as a result you can expect a lot of new lower weight packages to be introduced in the American market in the next 5 years.

---

*Assistant to Vice President, Continental Can Company.

With that introduction, I would like to devote the rest of my allotted time to recent and potential future resource conservation in packaging. Material resource conservation should be accomplished both by reducing the weight of packages where feasible, and by recovering and reutilizing the packaging materials when total energy considerations favor this approach. Energy conservation should be given emphasis since energy once used is gone forever, and liquid and gaseous fuel resources are limited. On the other hand, materials are not consumed. They are available for recovery and reuse after they have served their primary function.

I would like to digress a moment to mention our attitude toward recycling. The recent increases in both raw material and energy costs have increased the cost incentives for recycling. Municipal waste processing for recovery of materials and energy has become a profitable business that many large companies are investing in. A Continental Can and Metal Cleaning & Processing Company joint venture opened a new scrap can detinning plant in Wilmington, Delaware, last year using a new process that optimizes tin removal from scrap cans. This plant will not only recover up to 1,000 pounds of tin per day but also clean and purify the scrap cans and other ferrous waste so that it can be sold as very high grade scrap for new steelmaking. Steel produced from scrap only requires 30 to 40 percent as much energy as steel produced from virgin materials.

An even more impressive energy savings can be made with recovered aluminum cans. Here, ingots from scrap only require 10 to 15 percent as much energy to produce as ingots made from virgin materials.

However, getting back to weight reduction in the last 10 to 15 years, appreciable weight reduction has been made in many of the common food packages. The recently introduced "ultra low density" paperboard permits a 10-percent weight decrease in the folding cartons used to package dry foods such as rice, cereals, and pet foods. In 10 years, the weight of 1-gallon high density polyethylene bleach bottles has decreased 25 percent, and at the same time the quality of the bottles has improved. The replacement of the paperboard carton for six-packs of beverage cans with hi-cone polyethylene [illegible] type multipacks reduces the carrier weight by 90 percent.

Further, since 1959, the body weight of soldered beverage cans has decreased 20 percent. The introduction of welded and cemented tin-free steel body structure results in a further 5-percent weight reduction in addition to saving over 3,000 tons of tin and 7,000 tons of lead a year based on 1973. The weight of aluminum beverage cans has decreased 21 percent since 1965. The development of the necked-in structure has allowed an 8- to 10-percent reduction in the weight of beverage can ends. In the next 5 to 10 years, the weight of two-piece aluminum and steel beverage cans will be reduced an additional 12 to 20 percent while still meeting the present handling and filling requirements. If product and distribution specifications can be modified, even further weight reduction is possible.

The Kerr-Heye process for glass bottle production should permit 15 to 20 percent reduction in the weight of beverage bottles. But much larger bottle weight reduction will be possible through the commercialization of plastic beverage bottles which will reduce empty bottle weight by 75 to 80 percent. Continental Can, Monsanto, DuPont, and others have had extensive R&D programs underway for the last 6 to 7 years trying to perfect these containers.

Two other beverage containers, the Rigello plastic bottle and the Mirolite paperboard encased plastic bag, are under small-scale use in Europe for prepasteurized beer. These two packages offer up to an additional 10 percent weight reduction over presently planned plastic bottles, but at the sacrifice of a much shorter shelf life. Normal beverage containers can be stored for 6 to 12 months while the Rigello bottle and the Mirolite plastic bag have shelf lives at present of only a few weeks. In their present form, these containers are not satisfactory for the American market.

Another development which can have impact on beverage cans is the development of the non-detach foil plastic easy-opening tape seal announced by Continental Can last November. This concept eliminates the tear tab litter problem, but more importantly, since the adhesively attached tape can be used on either a steel or aluminum end, it will promote the use of all steel or all aluminum cans which will facilitate recycling of used containers from municipal waste. Other manufacturers are developing push-in button opening features which eliminate the tab litter problem and hopefully will be applicable to both steel and aluminum ends.

Less opportunity exists for reducing the present weight of metal food containers since the present sidewall and bottom thicknesses are already at their practical limit for straight-sided containers. However, there is a trend toward more beaded cans which do allow reduction of sidewall but may require modification of the filling, closing, and warehousing operations because of the reduction of axial strength caused by the beads. A typical example is the beaded 1-pound coffee can. At least one company has switched over to a special packing operation which permits a 25 percent reduction in the can body weight.

Two-piece cans offer a weight reduction for some food can applications at least in regard to the final can weight (manufacturing scrap is much higher than for three-piece cans). However, it is very dependent on specific can wall and bottom thickness requirements. In general, two-piece can structures offer major weight reductions only for pressure products such as carbonated beverages.

With the increasing cost and scarcity of tin, the use of tin-free steel for food container construction becomes more feasible. Tin free steel usage would reduce consumption of a fairly scarce material (tin) and facilitate recycling of the metal can from municipal waste since it would minimize the tin removal problem.

Another new food packaging system, retort pouches, offers a greater opportunity for weight and energy reduction in food containers. The retort pouch is a flexible pouch usually made from very thin aluminum foil laminated to polypropylene and polyester. This retort pouch has gained wide acceptance in Japan and is expanding rapidly in Europe at the present time. In the United States the need for Food and Drug Administration concurrence in its use and the unavailability of high-speed filling and sealing lines have delayed its introduction. However, its ability to reduce container weight by 80 percent when compared to steel cans, along with its generally superior ability to retain desirable food texture and flavor characteristics, would strongly indicate that this container will show very rapid growth in this country once FDA concurrence is received. Since the retort pouch is shelf stable, yet has the high product quality usually associated with frozen foods, it should replace a segment of this market, and thereby save the energy needed for refrigeration of frozen foods.

Composite fiber cans are also extending their market more and more as the technology of the container develops and allows packaging of the harder-to-hold products. At the present time, fiber cans are used for petroleum products, pet foods, clothing, toys, automotive additives and a variety of nonprocessed foods and fruit juices. Its reduced weight and predominant use of a renewable resource which is easily recycled for energy recovery would suggest expanded use of it in the future as the technology improves.

The packaging of liquid milk in polyethylene plastic pouches offers an 80- to 90-percent container weight reduction compared to the traditional gabled milk carton. However, extensive trials in Canada, Europe, and Massachusetts seem to indicate that it lacks customer appeal and, consequently, probably will not be widely commercialized especially since improved paperboard containers are being developed which will reduce milk carton weights by 15 to 30 percent.

In the bulk shipping area, considerable progress has been made in reduction in the weight of bulk shipping containers. Fiber drums are replacing metal drums; palletizing and shrink wrapping replacing corrugated containers; triple-wall corrugated replacing wooden containers; plastic corrugated replacing wirebound boxes; and foamed plastic tote boxes replacing wooden fish boxes. The trend toward lower weights in these areas should accelerate because of the effect of higher oil prices on shipping costs.

There are a few items where seemingly excessive packaging materials are used: small but relatively expensive items in open supermarket type stores: razor blades, stereotapes, batteries, and photo film are typical examples. Pilfering, especially by teenagers, has been a problem since it was so easy to slip these items into a pocket and walk out. The problem has been of sufficient magnitude to justify use of oversize blisterpack cards. These items are overpackaged but for good sound economic reasons.

I hope in this brief talk I have been able to outline some of the diverse requirements the food container must try to meet and to show the great strides that have already been made in reducing package weights and indicate some of the possible future developments which will further reduce material and energy contents of packaging systems.

Packaging systems are complex. I believe there already exist more than enough monetary and public sentiment incentives to guarantee strong competition between the various packaging companies to reduce the weight and energy content of packages. If left unencumbered, the packaging industry will commercialize them with a minimum dislocation of the over 1 million people working in the industry and in a manner which will optimize the combination of other package characteristics important to the consumer.

WASTE MANAGEMENT THROUGH PRODUCT DESIGN: THE CASE OF AUTOMOBILE TIRES

Robert B. Westerman*

Solid wastes from durable goods products, "product solid wastes," comprise but a small portion of refuse in general; yet they pose significant problems. Large quantities of refrigerators, washers, dryers, television sets, furniture, automobiles, tires, etc., are scrapped each year. In 1975 about 7.5 million automobiles and 200 million car tires can be expected to be scrapped. Each new year brings an increasing deluge.

Bulky solid wastes pose various separate, special problems for managers of private and public waste collection, transport, and processing and disposal operations. Specialized collection vehicles, on trips separate from general refuse collection trips, haul bulky solid wastes to disposal facilities. Bulky solid wastes require specialized processing equipment such as larger landfill compaction equipment or specially designed tire incinerators. These separate facilities and operations are costly additions to the already high costs of routine refuse handling operations.

Solid waste quantities and handling costs are determined by product designs. There is an inverse relationship between product design durability and the rate of solid waste generation. Automobiles, under current product designs, last an average of 10 years; cars produced and sold this year will, in general, require disposal in 1985. This current automobile design parameter generates 7.5 million scrap car hulks each year. Cars designed for an average lifetime of 15 years, however, would in time decrease the solid waste generation rate to 5 million scrap car hulks per year. Of course, the effects of automobiles already in the system and of increases in car sales, if realized, would mask this effect for some time. Nevertheless, the rate of solid waste generation from durable goods products is controllable through product design.

The resulting benefits attributable to decreases in the waste generation rate are substantial. Product changes toward longer durability designs provide benefits through waste decreases which: (1) avoid waste collection, processing, transport, and disposal costs; (2) provide aesthetic and ecological benefits through decreased litter and accumulation of waste in and on the land. Longer durability designs may provide conservation benefits through decreased resource usage rates; they may decrease the rate of costs to consumers for the services provided by durable goods. The value of these benefits can be very substantial.

---

*Assistant Professor of Management, California State University, Sacramento.

On the other hand, increased product durabilities foreclose decreased sales volume rates for manufacturers and sellers; washing machines that last twice as long obtain only one half the sales volume in a given planning period. Manufacturers, even if they should discover designs which—without extra cost—make their products more durable, would not implement such designs. They would, instead, seek less durable materials and designs provided that these could be implemented at not much more cost than those associated with the more durable design. This strategy creates larger markets, more sales commissions, and higher profits to business firms. The doctrine that "the most profitable is the most socially beneficial strategy" in this instance does not hold true.

The economic and environmental interrelationships between product durabilities and product solid wastes may be illustrated by analysis of one product; cost and benefit structures incident to product management, and to waste management, of durable goods most likely have much in common. Consequently, the case of passenger car tires contributes insight into the management of all product solid wastes.

WASTE TIRES

This year in the United States 200 million passenger car tires are being discarded as waste; similarly, large amounts will be generated in each succeeding year. Scrap tires are not amenable to routine solid waste handling procedures; tires are differently distributed and are not suitable for conventional collection, processing, landfill, or incineration operations. Waste tires pose special management problems.

There is no indication that a means for disposal of any significant portion of the tire waste stream even exists! Only 10 percent of the scrap tire stream is currently reclaimed, retreaded, or split into tire products. The remainder is left to accumulate. Accumulation in this case is not management; it is disregard and neglect. The disregard is based upon economic analysis.

The costs of adequately handling the accumulations of waste tires outweigh the benefits. The net costs for five prominent waste tire collection, transport, and recovery processes are listed in Table 1. Processing the tire accumulation for recovery is not economical for the tire industry, for consumers, or for any private entrepreneur.

Increasing tire durabilities is yet another tire waste management alternative. Bias belted tires, the most widely used tires today, last an average of 25,000 miles. At a rate of usage of 10,000 miles per year,

TABLE 1
COSTS OF PROCESSING WASTE TIRES

Tire collection, transport, recovery	Net processing cost per tire
Use as roadbase aggregate	$ .47
Use as asphalt additive	.60
Land reclamation	.51
Special incineration	.58
Destructive distillation	1.00

these tires last 2.50 years. A bias belted tire, then, generates one waste tire at the end of 2.50 years. Tires designed for longer durabilities generate less waste. During a 2.50-year period, 38,000-mile tires--the current steel-belted radial designs--generate only two-thirds of one waste tire. Passenger car tires designed to last the 10-year lifetime of a car, 100,000-mile tires, would generate only one-quarter of one waste tire every 2.50 years (Table 2).

TABLE 2
DECREASED WASTES DUE TO CHANGES IN TIRE CONSTRUCTION

Construction	Total mileage	Years*	Tire waste/yr	Waste in 2.50 yr	Waste decrease in 2.50 yr
Bias belted	25,000	2.50	.40	1.00	0.00
Radial	38,000	3.80	.26	.67	.33
Radial	100,000	10.00	.10	.25	.75

*At 10,000 miles per year.

A longer tire durability design, for 100,000 miles, can decrease the number of waste tires generated in the United States by 75 percent. Instead of 200 million waste passenger car tires each year, we can control the wastes to 50 million per year once enough time has passed for the tires system to reach a steady state. According to the recovery processing costs presented (Table 1) then, $70 to $100 million per year can be saved and waste handling costs avoided by a shift to 100,000-mile tires.

A computer simulation of the U.S. tires system illustrates the waste and market decreasing effects of a shift toward longer durability tires (Table 3). Model Run 2 incorporated a shift to 100,000-mile tires as original equipment on all 1975 model new cars, together with retreaded tires as replacements. The waste decreasing effects are most evident beginning in 1981.

EFFECTS ON THE TIRE INDUSTRY AND ON CONSUMERS

That 100,000-mile tires would eliminate a corresponding amount of the replacement tire industry is also apparent from Table [illegible]. Consumers would not need to purchase new tires every 2 or 3 years because 100,000-mile tires would last the life of a car under present auto designs. This plan has much appeal from the consumer's viewpoint since the requirement for a new set of tires to replace those worn out is unwelcome and unpleasant. Replacement tire purchases leave the consumer no better off than he was before the purchase. Consumers have but the same tire services after replacement as they had before, but at a substantial cost.

Consumers are not generally well-informed replacement tire buyers either. The array of tire products available is large and confusing. The 100,000-mile tire would avoid this confusion and would enable consumers to include the tire purchase cost in the original price of the car. It would seem to be a worthwhile idea to design tires to last the life of the car.

The cost of producing a 100,000-mile tire will not be much greater than the production cost of current radial tires. Production cost of the 40,000-mile radial tire is about $22; 45 percent of this production cost is attributable to materials used. Assuming that the materials needed to build the 100,000-mile tire are in linear proportion to the increase in mileage obtained over belted bias tires, 3.3 times as much material will be needed to produce 100,000-mile tires. If 40,000-mile tire equipment can be used for production of the more durable tires, then 100,000-mile tires can be produced for [illegible] each. If new equipment is required, the cost will be approximately [illegible]. Consumers most likely can obtain more mileage for fewer dollars with longer durability tires. This is, of course, unless the tire industry sets 100,000-mile tire prices very high.

Consumers may receive the same tire services via different product designs. Tire service of 100,000 miles could be obtained by using four belted bias tires, at [illegible] each, in succession, for a total cost of [illegible]. Alternatively, 100,000 miles could be obtained, as suggested here, from a single 100,000-mile tire which costs about [illegible] to produce and which could be sold at a price well below [illegible] even allowing for reasonable levels of administrative costs, marketing costs, and profits. Here, again, however, even if manufacturers discover designs to make their products more durable without extra cost, they would not implement such designs. They would, instead, seek less durable materials and designs to create larger markets. Prototypes of the 100,000-mile tire have been produced. Perhaps consumers and public decisionmakers for auto equipment [illegible] can help to regulate the tire industry towards implementing a longer tire durability design.

TABLE 3
SIMULATED WASTE TIRES AND NEW REPLACEMENT TIRE SALES: 1960 THROUGH 1990
(in 100,000's)

Year	New cars produced	Waste tires model run (1)	Waste tires model run (2)	Repl. tire sales model run (1)	Repl. tire sales model run (2)	Junked cars
1960	63	1,170	1,170	990	990	30
1961	66	1,280	1,280	1,020	1,020	41
1962	67	1,230	1,230	1,030	1,030	42
1963	69	1,260	1,260	1,090	1,090	33
1964	71	1,410	1,410	1,170	1,170	48
1965	74	1,455	1,455	1,200	1,200	51
1966	76	1,530	1,530	1,255	1,250	53
1967	78	1,545	1,545	1,280	1,280	51
1968	80	1,670	1,670	1,330	1,330	57
1969	82	1,655	1,655	1,345	1,345	62
1970	85	1,770	1,770	1,400	1,400	61
1971	87	1,760	1,760	1,475	1,475	63
1972	90	1,800	1,800	1,515	1,515	69
1973	91	1,790	1,790	1,505	1,505	68
1974	93	1,920	1,920	1,505	1,505	71
1975	96	2,000	2,000	1,655	1,655	73
1976	98	2,000	2,000	1,610	1,610	73
1977	100	2,115	2,115	1,730	1,730	77
1978	102	2,070	2,070	1,670	1,670	80
1979	103	2,205	2,205	1,700	1,700	79
1980	107	2,310	2,230	1,645	1,645	77
1981	109	2,215	2,090	1,775	1,590	81
1982	111	2,030	1,900	1,575	1,410	81
1983	113	2,165	1,175	1,725	1,090	83
1984	116	2,150	1,130	1,615	900	82
1985	117	2,240	1,290	1,805	855	87
1986	120	2,245	1,290	1,715	645	90
1987	122	2,370	1,045	[illegible]	555	97
1988	124	2,305	1,105	1,735	375	106
1989	126	2,330	1,070	2,005	305	111
1990	129	2,490	[illegible]	[illegible]	145	115

Although run 2 represents the policy of all [illegible] tires on original equipment cars, and [illegible] retreaded tires for replacement, beginning in 1975. Although these figures were taken from a single computer run, they suffice for a rough guide. [illegible] research should sample from the model to obtain average results.

The consumer economics, environmental, and waste control considerations we have discussed indicate that longer product durability designs for passenger car tires are a reasonable management alternative from a societal viewpoint. This alternative, as a waste management alternative, however, should be compared with the tire resource recovery methods (Table 3); it should be carefully evaluated, with respect to both public and private costs and benefits involved, to determine if justification for its adoption exists.

WASTE TIRE MANAGEMENT STUDY

Increasing tire design durabilities has many effects which impinge upon different segments of society at different times and for varying lengths of time. The effects which we included in our analyses are identified in Table 4. Deterministic measurements of some of these effects are displayed in Table 5.

The evaluation of the five recovery processes, from a social perspective, is the uncomplicated summation of all the costs and benefits indicated in Table 5. Four of the five processes, all of which were uneconomical from a profit oriented viewpoint, are economical when the public aesthetic and ecological benefits are included in the analysis. These benefits include both the values of products recovered and the increase, or maintenance, of quality of the environment as measured through waste handling costs avoided. Only destructive distillation, the highest cost and, curiously, the most promoted alternative, still remains uneconomical.

COSTS AND BENEFITS OF 100,000-MILE TIRES TO THE TIRE INDUSTRY

A detailed examination of the benefits and costs relevant to the longer durability tires alternatives is given in the paper, *The Management of Waste Passenger Car Tires*. There we examine the interesting and dramatic case of 100,000-mile tires. The 35,000-mile tire case, with one exception which will be noted, parallels that of 100,000-mile tires.

Some of the waste management costs of longer durability tires are incurred at the time of production. Each 100,000-mile tire costs more to produce than its alternative belted bias tire. These increments total $11.87 per 100,000-mile tire produced. Small production volumes are required with longer durability tires; sales and administrative costs, when allocated equally over the volume of 100,000-mile tires, total $7.09 per 100,000-mile tire. They represent a benefit. The 100,000-mile tire loses revenues due to tire production and sales avoided, however, 78 percent of the demand for tires is eliminated. This is, of course, demand for tires in terms of number of tires. One 100,000-mile tire

TABLE 4

BENEFITS AND COSTS INCLUDED IN THE VALUE COEFFICIENTS

Alternative	Benefits					Costs								
	(1) Product value and decreased waste	(2) Decreased cost to consumers	(3) Corporate tax transfers	(4) Aesthetic and ecological	(5) Conservation	(1) Reconcentration	(2) Dealers' inventory	(3) Batch collection	(4) Bulk transport	(5) Volume reduction	(6) Processing and waste residues	(7) Administrative and marketing	(8) Opportunity cost	(9) Corporate profits tax
(1) Incineration	B_{11}	B_{12}	B_{13}	B_{14}	B_{15}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}
(2) Asphalt additive	B_{21}	B_{22}	B_{23}	B_{24}	B_{25}	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}
(3) Road aggregate	B_{31}	B_{32}	B_{33}	B_{34}	B_{35}	C_{31}	C_{32}	C_{33}	C_{34}	C_{35}	C_{36}	C_{37}	C_{38}	C_{39}
(4) Land reclamation	B_{41}	B_{42}	B_{43}	B_{44}	B_{45}	C_{41}	C_{42}	C_{43}	C_{44}	C_{45}	C_{46}	C_{47}	C_{48}	C_{49}
(5) Destructive distillation	B_{51}	B_{52}	B_{53}	B_{54}	B_{55}	C_{51}	C_{52}	C_{53}	C_{54}	C_{55}	C_{56}	C_{57}	C_{58}	C_{59}
(6) Retreading	B_{61}	B_{62}	B_{63}	B_{64}	B_{65}	C_{61}	C_{62}	C_{63}	C_{64}	C_{65}	C_{66}	C_{67}	C_{68}	C_{69}
(7) 25,000-mile tires	B_{71}	B_{72}	B_{73}	B_{74}	B_{75}	C_{71}	C_{72}	C_{73}	C_{74}	C_{75}	C_{76}	C_{77}	C_{78}	C_{79}
(8) 100,000-mile tires	B_{81}	B_{82}	B_{83}	B_{84}	B_{85}	C_{81}	C_{82}	C_{83}	C_{84}	C_{85}	C_{86}	C_{87}	C_{88}	C_{89}

TABLE 5

COSTS AND BENEFIT VALUES: TIRE RESOURCE RECOVERY

	C_{11}-C_{15}	C_{16}	C_{17}	B_{11}	B_{13}	Net benefits
Incineration	$.00	$ .10	$.05	$ .15	$.92	$.00
Asphalt additive	.00	1.87	.21	1.90	.92	.21
Roadbase aggregate	.00	.17	.05	.55	.01	.44
Land reclamation	.00	.05	.01	.10	.02	.09
Destructive distillation	.00	.20	.05	.10	.02	-.15

replaces, approximately, four belted bias tires at a loss of $27 each. If a price of $100 is charged for the 100,000-mile tire, then no market in terms of dollar volume is lost; in fact, when the time value of money is considered, the tire industry is better off. There is a difference in profit levels and corresponding corporate profit taxes in addition. The difference between corporate profit taxes on one $100 tire and four $27 tires (at 50 and 10 percent gross profit margins, respectively) is an added cost of $7.44 per 100,000-mile tire. Taking the time value of money into consideration, the cost would be even higher. Finally, each 100,000-mile tire finally requires disposal. Assuming that disposal characteristics of a 100,000-mile tire are the same as those of belted bias tires, and assuming that the tire industry is to pay for its waste handling, each 100,000-mile tire costs $.92 to collect, process, transport, and landfill. Yet it displaces four belted bias tires. The result is a $2.76 benefit.

100,000-mile tires	Incremental cost per tire
Production	$13.47
Corporate profit tax	7.44
Total including cost 10 yrs.	$20.91
	Incremental benefits
Administrative costs avoided	$ 7.09
Waste costs avoided	2.76
Total including benefits 10 yrs.	$ 9.85

The net cost of each 100,000-mile tire, in this representation of the tire industry's viewpoint, is $11.06 over 10 years. This amounts to

$2.77 during the lifetime of each belted bias tire. Of course, if the selling price for 100,000-mile tires were set at a price less than $100 per tire, a not unlikely [illegible], then there would be a corresponding opportunity cost to the tire industry. If 100,000-mile tires were sold at current prices, say around $65 each, then there would be a $40 opportunity cost over 10 years. This corresponds to an opportunity cost of $10 for each belted bias tire lifetime.

It is obvious that the tire industry's evaluation of 100,000-mile tires is one of overwhelming disfavor. If the alternative is to be of value, it must be due to factors other than those discussed above. If the alternative is to be implemented, it must be by regulation or by setting appropriate economic incentives for the industry.

The 38,000-mile radial tire, at a price of $65 each, offers a profit benefit to the tire industry. The price for tire services is higher than the comparable price for belted bias tires. Consumers, however, pay the corresponding cost.

PUBLIC BENEFITS OF THE 100,000-MILE TIRE

There are substantial benefits which accrue to society with the 100,000-mile tire. It conserves valuable resources, preserves the quality of the physical environment, and provides additional tax resources to the public; it may offer a lower cost of tire services to consumers.

Conservation of Resources

Longer durability tires conserve resources. The tire carcass accounts for 80 percent of the $11.54 manufactured value of a belted bias tire. The number of tire carcasses needed is decreased by the 100,000-mile tire. In lieu of four tire carcasses each 10 years, or $40.92 of resource value, one tire carcass, or $15.70 of resource value, is used in a 100,000-mile tire. Thus each 10 years $27.92 worth of resources are saved and conserved for later or other uses.

Preservation of Quality of the Environment

The 100,000-mile tire decreases the rate of waste generation by 75 percent as compared to belted bias tires. There is a corresponding decrease in the use of the physical environment as a sink for waste disposal. Decreased use of the environment parallels maintenance of environmental quality; it improves the environmental quality relationship to waste generation. A conservative, surrogate measure of this benefit is available through the value of the waste handling costs necessary if the wastes are sunk in the physical environment. This amount is $.92 per waste tire, $2.76 in 10 years for the three waste tires avoided. Thus $2.76 of aesthetic and ecological benefits in terms of quality of the environment are provided by a 100,000-mile tire over 10 years.

Tax Benefits

The additional corporate taxes paid by the tire industry, when 100,000-mile tires are substituted as original equipment on automobiles, are transferred to society; these are funds available to the public. They can be used by the public to buy whatever benefits are desired.

Cost to Consumers

The 100,000-mile tire at a price of $108 each costs the same amount as the four belted bias tires which it replaces; it costs a bit more, actually, when the time value of money is included in the analysis. At a production cost of $30, however, there is much potential for providing 100,000 miles of tire service at less than $108 and yet still allow the tire industry to cover their costs and to realize substantial profits per tire. Even if administrative, distribution, and marketing expenses total $30 also, a 100,000-mile tire sales price of $81 per tire would provide 26 percent of the selling price in gross profits. This is comparable to profit margins on current bias belted tires. This price would provide $27 in benefits to consumers over 10 years, about $7 per belted bias tire replaced.

The public benefits of 100,000-mile tires are summarized in Table 6.

TABLE 6
THE 100,000-MILE TIRE: PUBLIC BENEFITS

Category of benefit	Per tire $ value of benefit in 2.5 years
Conservation	$ [illegible]
Environmental quality	.[illegible]
Tax transfers	1.[illegible]
Cost to consumers	7.00
Total benefits	$16.[illegible]

SOCIAL JUSTIFICATION FOR 100,000-MILE TIRES

The $7 decreased cost to consumers, if effected, would impose a corresponding $7 opportunity cost to the tire industry. The net costs, above, for the 100,000-mile tire alternative from the industry's viewpoint were $2.77 during each 2.8-year period. With the opportunity cost added the net cost is $9.77 per tire. The corresponding benefits on the public side, $16.46, are clearly and substantially in excess of the costs even when opportunity costs to industry are included in the analysis. Consequently, a requirement that tire producers design for longer, 100,000-mile, durability is socially justified.

100,000-MILE TIRES: COMPARISON WITH PUBLIC WORKS RESOURCE RECOVERY METHODS

The evaluations for the resource recovery methods and the evaluation for 100,000-mile tires, in net benefits per 2.8 years, may be compared to determine the desirability of a shift to 100,000-mile tires as a waste management alternative. Our data for 100,000-mile tires were organized on a "per 2.8 year" rate basis. Our standard for comparison, the belted bias tire, lasts 2.8 years also. All 100,000-mile tire costs and benefits were measured as incremental costs with respect to bias belted tires and so we compare costs and benefits of the bias belted system each 2.8 years with costs and benefits of the proposed 100,000-mile alternative each 2.8 years. The net benefits per bias belted tire are measured in both cases. The $6.69 net benefit for 100,000-mile tires is clearly and sustantially in excess of the best tire resource recovery method, the $.44 per tire net benefit for waste tire use as roadbase aggregate.

CONCLUSION

A requirement that passenger car tires be designed to last 100,000 miles, the life of the car, is socially justified; 100,000-mile tires are the economically preferable waste management alternative for tires. Consideration should be given to development of the methodology for manufacture of 100,000-mile tires and to the means of implementing this alternative.

REFERENCES

Cooper, T.A. The impact of the radial tire in the United States. M.S. Thesis, Drexel University, Philadelphia, 1973.

Gill, G.S. Public price support as an incentive to the use of solid waste as a resource. Compost Science, 12(1):16-19, Jan.-Feb. 1971.

Mishan, E.J. Cost-benefit analysis: an introduction. New York, Praeger Publishers, 1971. 364 p.

Robinson, Joan. Economic philosophy. New York, Doubleday and Company, Inc., 1962.

Sawyer, J.W., Jr. A regional model of the automobile steel scrap processing sector of the economy. Ph.D. Dissertation, University of Pennsylvania, Philadelphia, 1973.

Westerman, R.R. The management of waste passenger car tires. Ph.D. Dissertation, University of Pennsylvania, Philadelphia, 1974. 238 p.

CONTEMPORARY DAIRY PACKAGING: CONSUMER APPEAL AND CONSERVATION

Charles R. Russell*

At International Paper Company, dairy packaging is an important part of our business. We are concerned about maintaining our position of leadership in this field and in order to do this, we have to be constantly alert to new methods and new materials that might offer an improvement in the package or an economy in the system.

This competitive pressure has led us to many innovations that have been of benefit in one way or another and sometimes due to the magnitude of dairy packaging these benefits can be significant far beyond our immediate objective. Such is the case with our new entry in the packaging of milk in the individual service size containers.

We appreciate being invited by the EPA Office of Solid Waste Management Programs to discuss two of our most universally beneficial package developments with you today at this Conference on Waste Reduction.

A NEW HALF PINT

Eco Pak is the very descriptive name we have originated for our new half-pint milk carton. We say descriptive because Eco stands for both ecology and economy in their true sense when applied to this new package. The Eco Pak carton reduces the impact on the environment by using considerably less material, i.e., paperboard and polyethylene, thus benefiting the ecology. At the same time the new carton provides for important cost savings to the milk processor and is already being referred to as "the economy package."

Actually, the Eco Pak is a redesign of the regular Pure-Pak half-pint carton with a taller, more slender shape which provides for nearly the optimum use of packaging material in relation to product packaged. We have reduced the cross sectional measurement of the container from a 2 3/4-inch square to a 2 1/4-inch square. This means considerably less paperboard in the top and bottom with only a slight increase in the height of the sidewalls. The net result is [illegible] percent less square inches in each carton blank. At the same time we are using a lighter weight, lower density sheet of paper which provides sufficient rigidity and strength for performance but actually weighs from 11 percent to 20 percent less per square foot than the 170# or 180# regular cartons.

---

*International Paper Company.

While we have referred to Eco Pak as a half-pint package because that size represents the major volume, there are 4-ounce, 6-ounce and 10-ounce sizes available also. Another version has a flattened top to enable more filled containers to be packed in a case for delivery.

Thus through technological improvement by design we are using less material and therefore conserving resources and energy while accomplishing the same end, satisfactorily packaging milk for the individual consumer, with less contribution to the waste stream.

A Huge Market

In order to fully realize the scope of this package innovation, a better understanding of the 8-ounce and 10-ounce market is necessary. Each year 882.5 million gallons of milk are packaged in more than 9 billion cartons to supply the 8-ounce and 10-ounce market. This requires 175,000 tons of polyethylene coated paperboard. If each of these 9 billion cartons were placed side by side in a single row, they would stretch for some 420,000 miles. I understand it is only 240,000 miles from the earth to the moon, so this gives you some idea of how many packages we are talking about.

The bulk of the 9 billion cartons is consumed in school milk programs. It is estimated that each school day more than 30 million people will drink from a half-pint paperboard container.

Dairy Industry Consolidation

You may well question why a packaging change of this sort did not come about earlier. The answer lies in the changing scope of the individual dairy processing plants over the last 25 years. In 1950 there were approximately 8,000 dairies processing 50 billion pounds of fluid milk annually. This is compared to the current 2,000 dairies which process 80 billion pounds of fluid milk each year. The average annual output per dairy has increased from 6 million pounds to 40 million pounds. Twenty-five years ago dairies were much smaller in physical size, productive capacity and sales volume than the modern dairy. When the half-pint market was converting from glass to paper in the 1940s and 1950s, a carton was needed with the physical characteristics to adapt its forming, filling, and sealing to existing machinery. The small dairy of the 1950s could not afford specialized equipment for forming and filling half-pint cartons. Thus, the original half-pint container evolved from the standard quart design using the same cross section so that it could be filled on the same basic quart machine.

The modern dairy now requires efficient high-speed equipment to meet the increased demand that changing circumstances have placed upon it. The substantial increase in sales volume per plant now justifies the expenditure for large-scale, specialized equipment that is needed to form, fill, and seal Eco Pak.

Recognizing this fundamental change in the dairy industry, International Paper proceeded with its research to design a half-pint carton that would better utilize paperboard and polyethylene. The end result of this research effort was Eco Pak.

Economic and Environmental Impact

We mentioned that the principal design changes in the regular or standard carton were the changes in the cross-sectional dimension from a 2 3/4-inch to a 2 1/4-inch square for 33 percent less square inches of area and a reduction in the basis weight of the paperboard ranging from 11 percent to 20 percent. While our initial effort was to design a more economical half-pint milk carton, it wasn't long before the implication of these package modifications on the environment and the dairy industry economy were recognized.

It is somewhat difficult to believe that just changing the container design from short and fat to tall and more slender and reducing its overall weight by less than one-fifth ounce could possibly have much of an impact in the area of resource conservation. However, when this overall reduction is applied to a 9-billion-carton-per-annum market, the end results are indeed impressive.

Because we can use less material in the new design, Eco Pak offers the dairy savings in purchase price of $1.11 per thousand, which justifies the dairy's investment in higher-speed, specialized machinery. On 9 billion cartons, $1.11 per thousand represents $9,990,000 to the dairy industry in purchase cost alone.

Savings are also realized in the outbound delivery of the filled Eco Pak cartons. With the new construction, the dairy is now able to deliver as many as 75 Eco Paks in a standard milk case whereas only 44 of the regular half pints could previously be handled. This can amount to a 70-percent increase in units per delivery truck based on space saved.

It should be noted that none of the savings has come about at the expense of the consumer. In fact, Eco Pak is a better consumer package than the standard half pint. Eco Pak is easier to handle, more readily disposable, and its smaller pouring spout provides a better aperture for drinking directly from the carton.

The resulting effect of the redesigning is most significant when expressed in terms of conserved resources. If the dairy industry converted to Eco Pak 100 percent, a saving of 58,000 tons of materials would be realized and of course the energy required to produce and transport these [illegible],000 tons would not be expended. One thousand less rail cars would be needed to bring the fewer tons of paperboard from paper mills to converting plants. In addition, 1,000 less truckloads would be required to transport the finished product from the converting plant to the dairy. This is in addition to the savings at the dairy and in the delivery system. Although we have not attempted to calculate the energy savings or the reduction in the contribution to the waste stream, the following is a quote from Mr. Michael [illegible] of the EPA that will be published in a fact sheet:

> Using anticipated [illegible] control standards for air and waterborne pollutants, air emissions would be reduced by about 1,000 tons and waterborne wastes would be reduced by over 800 tons from the paper savings alone. Energy saved by not producing the extra paper would amount to over [illegible] trillion Btu annually. This energy savings is equivalent to [illegible] barrels of oil per day.

Industry Acceptance

We are most pleased that the dairy industry is showing that they recognize the advantages inherent in the Eco Pak system and that they will invest the capital required to install the new machinery necessary.

Since last summer when there was only one prototype machine in operation, there have been some 20 machines installed in dairies using Eco Pak cartons at the rate of [illegible] million a week. This means over 11 million children are drinking milk from Eco Pak containers each school day.

Plans are going forward for the machinery manufacturers to build as many as 60 more machines to be installed by the beginning of school in September of this year. We feel confident that the industry will be more than 50 percent converted to the Eco Pak style carton by the end of 1977.

We are proud to have instigated this trend to a more economical and more environmentally sound milk package.

A NEW FAMILY SIZE

In addition to the Eco Pak we have also introduced a new family-size milk package which might be of interest to you as a technical option for reducing product waste.

Again, through package design, we have developed a carton to hold 3 quarts of milk, a size not previously available, which offers several consumer advantages while at the same time reducing the ratio of packaging material to product packaged.

The 3-quart carton is rectangular in shape rather than square so that it fits in the hand and also the shelves of a refrigerator door. The lighter weight of 3 quarts instead of a gallon makes the package easier to lift and handle.

Saves Materials

Of greater importance is the fact that this 3-quart package, due to its design and the paperboard used, can reduce the material required to package a given quantity of milk by 10 percent (compared with paper gallons) to 15 percent (compared with paper quarts).

If 20 percent of the paper milk package market were converted to the 3-quart package, we estimate a saving of 25,000 tons of plastic-coated paperboard.

We believe that a conservation of this amount of material plus the resultant saving in energy is worthwhile, especially when coupled with a package that is more desirable to the consumer because of convenience.

The dairy industry, because of its tremendous package volume, does offer truly worthwhile conservation opportunities.

At International Paper we are trying to take advantage of these opportunities by offering innovations in packaging that conserve material and at the same time render a better service to the consumer.

FAST FOOD PACKAGING AND WASTE REDUCTION

Norman D. Axelrad*

As you know, McDonald's sells hamburgers. We sell so many hamburgers that we have become the largest single purchaser of beef in the United States. (I understand that the U.S. government is our nearest competitor in the beef purchasing process.)

McDonald's as one of the largest members of the fast-food industry has 3,300 restaurants in the United States and 17 foreign countries. Approximately one-third of these restaurants are owned and operated by McDonald's Corporation, and the others are owned and operated by independent licensees.

As a highly conspicuous user of paper packaging, the fast-food industry draws a fair share of public environmental attention. The major areas of concern include claims of excessive use of paper and its claimed depletion of our forest resources, and the litter problem. More recently, as our cities are running out of places to dump their garbage, interest is turning to the fast-food industry's contribution to the solid waste stream. I would like to briefly comment on these points.

As to the assertion that the use of paper packaging depletes our forest resources, this is not the case. Integrated paper companies are in the business of planting and harvesting hybrid pulpwood forests much as a farmer plants crops. Forest lands are now 70 percent of what existed when Columbus discovered the New World. The U.S. Forest Service has publicly confirmed that there is nothing approaching a pulpwood shortage now or in the near future.

As to solid waste reduction, and its application to packaging and the role of the fast-food industry in particular, I offer a few interesting facts. First, all of the nation's paper packaging combined account for 13 percent of total collectible solid wastes. The exact portion of the solid waste stream contributed by the fast-food industry remains unknown. However, it is estimated that the fast-food industry uses approximately 1.3 million tons of paper per year which would account for approximately 3.8 percent of the paper packaging in the solid waste stream. However, this data must be viewed in the perspective of a recent study by the Illinois Institute of Technology which revealed that a McDonald's restaurant actually produces less packaging waste per person per meal than a comparable meal prepared at home. Packaging costs in the industry, as a ratio to sale price of products in other food distribution businesses, are among the lowest.

---

*Vice President, Public Affairs, McDonald's Corporation.

However, I am not here to discredit the critics of the fast-food industry with a few palliatives that say, "We're really not that bad, folks." Rather, I would like to share with you the approach that one fast-food corporation, McDonald's, is taking to further reduce its contribution to the solid waste stream, and to encourage your suggestions on any further improvements we might make.

There are obviously several social and economic disadvantages of wasteful and irresponsible packaging. These business disincentives serve as an invisible regulator of business conduct. As a consumer-oriented business, we desire to establish and maintain a positive customer public relations posture. Competition also has an impact on operational decisionmaking. These forces lead a company to respond to the public's interests and expectations in the selection of packaging materials. The issues of biodegradability, recycled or recyclable materials, paper versus plastics, the quantity and cost of packaging, and its likelihood of litter, are factored into the decisionmaking equation. Let me illustrate: (1) Litter bearing the name of any particular company is an excellent example of negative merchandising. People are not encouraged to buy your product or use your services when they see your garbage littering the environment. (2) Packaging costs money. We're in the business of selling food and beverages, not paper packaging. It costs money to design, order, purchase, ship, and put something into a package. It also costs money to dispose of packaging. A McDonald's restaurant must pay to haul away its trash. This trash consists mainly of used packaging.

While these dollar costs are in fact passed on to the consumer in order to make a profit, the net effect is to raise the price of the product. Since the highly competitive fast-food industry merchandises its ability to serve quality food at reasonable prices, no company can afford to let its prices wander upward. Competition and customer resistance would quickly and effectively eliminate those companies that allow packaging costs to push prices up. In fact, McDonald's packaging costs, as a percentage of dollar sales, have declined in the past several years.

There is of course another reason to reduce packaging. The present energy and food crises have effectively brought home the message that the world's resources are not infinite. It is increasingly apparent both in the United States and throughout the world that there are certain levels of resource and energy consumption that nature will not tolerate or maintain. A new conservation ethic is replacing the traditional spawning of disposable material goods.

With all these disincentives, what is the rationale for packaging at all? Why are wraps, lids, cups, straws, stirrers, cartons, cutlery, boxes, and paper and plastic bags so much a part of the fast-food industry?

Our customers want a quality product, a clean and sanitary eating environment, and quick, efficient service. Packaging is designed to meet these requirements. First, packaging serves to retain heat and moisture of food and makes it possible for the customer to transport a purchase away from the restaurant. Second, packaging does help to guarantee that the food will retain its basic form through preparation, handling, and transportation. Third, packaging improves sanitation by protecting the food. And lastly, the use of disposable packaging reduces the amount of labor, equipment investment, and space that would otherwise be needed to handle china service.

Ten years ago well over 80 percent of the food McDonald's sold was consumed in the automobile or at home. Proper packaging was essential in order to ensure that the food retained temperature and moisture and remained intact and appetizing through the post-sale transportation process. As the industry gradually changed in concept from drive-in to sit-down restaurants, opportunities to reduce packaging have arisen. Today approximately 60 percent of the food sold by McDonald's is consumed in the restaurant. While the evolution was taking place, certain packaging needs remained, that is, delivering a quality product, quickly, inexpensively, and in an appetizing (uncrushed, warm, moist, together), aesthetically pleasing way. Some packaging systems became obsolete and unnecessary, and therefore excessive. Most companies redesigned their packaging to reflect their evolving business formats. And some did not.

At McDonald's, one of the foremost missions of our packaging is to satisfy our business system: we attempt to anticipate demand by preproduction of food and holding it for purchase. So when the customer places an order, it's already prepared and waiting. Producing food in advance and holding it for a few minutes makes it possible to serve large numbers of people in a reasonable amount of time. The economics are basic. High volume makes profit possible on low prices. Moreover, preproduction makes possible a more efficient utilization of labor.

In discussing the role of packaging within the McDonald's system, I hoped to share with you the complexity of the problem. The ever-present challenge is how to enhance the functional contribution of our packaging to our business. The question here is, does a particular form of packaging allow us to serve a fresh, hot product to our customers? At the same time, we must deal with the disadvantages of irresponsible use of packaging. Obviously, excess packaging serves neither our economic goals nor public expectations. In attempting to meet this challenge, we have developed several strategies.

Because of our evolution from a drive-in carry-out to sit-down family restaurant, it has become possible to redesign or even eliminate some packaging, resulting in reduction in packaging. We have, through announced corporate policy, attempted to eliminate disposable carrying trays, cup lids, and paper bags for use by customers eating in the restaurant. We do this by serving food and beverages on reusable plastic trays. Due to our large numbers of customers and the need to serve customers quickly, this means placing extra demands on our order takers who now have to ask if the customer will be eating the meal in the restaurant or taking it out. It's difficult to change old habits, but more and more of our restaurants are responding as we continue to emphasize the cost and merchandising benefits of this source reduction program to our employees and licensees. We believe this policy will soon be adopted in all our stores and significantly reduce the use of unnecessary packaging by as much as 40 percent.

Our sandwich boxes do the job, but we're not satisfied. We're looking for a better package and a better system.

Our latest experiments in reducing packaging involve the use of alternative materials. We are presently testing polystyrene packaging. Our concern about the environmental tradeoffs between polystyrene and paperboard cartons prompted our commissioning the Stanford Research Institute to make an exhaustive review of all the evidence on the issue. SRI concluded that a plastic-based product is more acceptable from an environmental standpoint than paper!

Among the factors considered by Stanford Research were:

1. Polystyrene uses significantly less energy in the production process.

2. Polystyrene packaging being tested by McDonald's is considerably lighter than comparable paper packaging, approximately one-fourth to one-fifth the weight.

3. Polystyrene offers several advantages in the disposal process. Among these advantages are secondary utilization of polystyrene containers; a potentially profitable market for the recycled product; if incinerated properly, polystyrene represents an efficient means of energy production; and if used in a landfill, polystyrene will not release effluents into the air or water systems.

The cost of the polystyrene container is roughly comparable to or less than the cost of paper. In addition to polystyrene improving the heat and moisture retention for our sandwiches, it could also permit a significant reduction in the overall weight, volume, and pieces of paper packaging used. Specifically, sandwich wraps, boxes, and collars would no longer be required. Further, it is our hope that the development of a compact pelletizing process would make it possible for us to profitably reclaim a substantial portion of this packaging for sale and eventual reuse in non-food related products.

A strategy we have employed with some success is the use of recycled paper. At the present time, approximately 19 percent by weight of McDonald's packaging is recycled material. We had fairly high hopes for large scale utilization of recycled paper. However, we found that recycled paper was significantly more expensive than new stock. Then we learned that more recycled paper was needed to produce the same package strength. For example, a French fry box made of recycled paper weighs eight times more than the same box made from virgin fiber stock. We also discovered that recycled sandwich wrap doesn't have a memory, that is, hold a fold very well; that packaging made from recycled paper comes in a variety of shades of unappetizing grey; and that neither McDonald's nor the Food and Drug Administration are happy about the chemicals found in recycled paper coming into direct contact with hot food. And finally, our customers were not receptive to the idea of eating food out of recycled paper packaging.

In addition to the packaging of our sandwiches, we are also concerned about the packaging of the food we receive from our suppliers. (Perhaps I should point out that McDonald's does not produce or distribute its own food or supplies.) We have had pilot programs to recycle corrugated boxes, but we no longer consider this the most sensible way to proceed. In the spirit of source reduction, we have significantly reduced the packaging waste from our suppliers through the use of two-way containers, packaging with secondary uses, and reduction of packaging material. We will continue to push our suppliers and distributors toward this course.

Packaging obviously has a merchandising impact. But as I indicated earlier, in the fast-food industry this can be negative as well as positive. When it is found on city streets, it is no longer packaging; it's litter. Eliminating unnecessary or excessive packaging reduces the likelihood of litter. But this is not enough. Our store personnel are instructed to retrieve litter far beyond the premises of our stores. But to be effective, we also need to instruct and educate the users of our products. This is done, in part, through messages in the media, via commercials, through local community involvement in conservation, and most significantly, through educating youngsters in the schools.

We have developed and distributed an Ecology Action Pack. It is used as a classroom aid to teach primary school children about conservation, source reduction, and litter. The Action Pack, containing spirit masters with classroom activities, has been used by millions of children as an environmental supplement to their social studies curriculum. The Action Pack was so well received by teachers that we followed it with a film and workbook entitled "Messology," which instructs youngsters on recycling through developing new uses for discarded materials.

Obviously, our society consumes and disposes of too many things which contribute to the solid waste stream. Market forces of cost, competition, and public attitudes, combined with an emerging conservation ethic will motivate private efforts in providing effective and efficient solutions for solid waste reduction. This is preferable to a centralized authority arbitrarily determining what products or packaging should be eliminated.

McDonald's views its leadership in the fast-food industry with a social responsibility to the public. Much of what we have done, and will continue to do, will influence the industry. We hope that our initiatives and search for better ways for waste reduction, resource recovery procedures, and promoting the environmental conservation ethic will be advanced by the industry.

"BRING 'EM BACK, REPACK AND SAVE"

Alan R. Greene*

The notion that our way of life causes us to buy the things we do and causes those same things to impact upon the environment and our resources is a notion that is beginning to sink in with the American consumer. It is really the essence of the challenge of campus youth in recent years, the challenge of our lifestyles. It's not a new notion, nor one not followed in other parts of the world. But it is new to American consumers. It has stood the test of time in Europe, where land scarcity and resource dependence are centuries old. To think it won't stand the test of time in this country is to refute the facts that surround us. Our population is becoming crowded, and our once abundant resources are dwindling. Consumers are becoming aware.

In July of 1971, the Management Committee was asked a series of specific questions by the members of the Environmental Concerns Committee. One of those questions seems appropriate for review, for the answer was somewhat causal to the development of the Milwaukee "Bring 'em Back, Repack and Save" program, which is the subject of this report.

> Question to Management: "Is the Red Owl commitment to our environment sufficiently strong and bold to permit the alteration, to include a greater emphasis on environmental factors, of retailing plans, programs and practices which are designed mainly to bolster sales and profits?"
>
> Answer: "Yes, retailing plans and programs can be changed to place a greater emphasis on environmental factors as long as they are effective in their aim to bolster sales and profits."

The program to "Bring 'Em Back, Repack and Save" was conceived by the members of the ECC to accomplish the objectives of sales and profits, and to be in tune with some of the new "lifestyle" thoughts that have invaded consumer thinking. It was to be a program that would make an encouraging appeal to "Bring 'Em Back," but not a forcing appeal. A shopper could use all, any part, or none of the program to save both money and resources, and still feel comfortable shopping at Red Owl.

Making the return of reusables and returnables sufficiently convenient seemed to be the single most important design problem. The design of just such a system was accomplished, and a marketing program was developed and approved. There are two basic questions that must be considered separately and concurrently with this report:

---

*Director, Environmental Affairs, Red Owl Stores.

1. Is "Bring 'em Back, Repack and Save" a workable market program?
2. Is the market ready for this or any other similar retailing program?

This report will attempt to answer the first question with precision. The reader is invited to join with the authors and users of the program in attempting to answer the second question. For that is one of timing and business judgment.

SUMMARY OF CONCLUSIONS

The program to "Bring 'Em Back, Repack and Save," as tested in Milwaukee, Cedarburg, and West Bend, is mechanically sound but advertising dependent. It is not recommended as a short-range marketing program but as a longer range program. The program is recommended to be stepped up with more advertising in the Milwaukee stores and introduced in the Twin Cities market. Segments of the program are seen as immediate candidates for all stores.

The priority placed on the investment required to achieve sales and profit results is looked upon as follows: Short-range market expectations entail medium investment, low risk, and low-to-medium return while long-range market expectations entail low investment, low risk, and medium-to-high return.

DESCRIPTION OF THE MARKET PROGRAM

"Bring 'Em Back, Repack and Save" is a new system with which customers may do their shopping. Their motivation to take advantage of the system may be economic, may be environmental, or a combination of the two. It is designed to assist high volume shoppers to take advantage of the savings that follow from returnables and reusables. Of course, the system works well for low volume shoppers too, but their patterns of shopping are not really inhibited by the inconvenience of returnables and reusables.

A customer will enter the store with a shopping bag containing returnables and reusables. She may, if she wishes, hook the shopping bag to the handle end of the cart to transport the items through the store and to the checkstand. As she shops the store, she will pack her own eggs from a bulk display of grade A large, using her own egg carton. If she has no egg carton of her own, then she may select eggs from a packaged display. As she proceeds through the store, she will be reminded of the savings available with different items of merchandise that fit the program. Milk and beverages in returnables are sold from appropriate displays in the conventional manner and highlighted with "shelf talkers."

The checkout counter will be the point from which in-store selling will be more direct. For the more complex transactions to take place, the checkers' duties will include the following:

1. Stamp any new egg cartons and new shopping bags. For the customer not on the program, let the customer know why the merchandise is being stamped and invite her to join the program.

2. Ring up the groceries, as usual, and then count the number of egg cartons and grocery bags returned and repacked, to make refund for those items. Bags are 2 cents each and egg cartons are 1 cents each. The amount of the refund should not be deducted from tape totals, but returned to her in change. This is our savings passed on to her.

3. Handling of the milk and soda pop returns should be as usual for deposit containers. The packing of the grocery bags should first make use of the returned sacks, along with any new or used plastic shopping bags the customer may have.

Upon returning home with the groceries, the customer will need advertising reminders to "Bring 'Em Back, Repack and Save." The advertising inducements to join the program could also take the form of additional savings for "Bring 'Em Back" shoppers, such as 5-cent savings on repacking your own eggs at times, or double savings on the return of grocery bags, 4 cents each.

Store employees should be sufficiently enlightened with program information to share our corporation's knowledge and concern with customers who bother to ask. Consumer fact sheets should be available to assist this side of the program.

ANALYSIS OF THE 8-WEEK MARKET TEST IN MILWAUKEE

The market test for "Bring 'Em Back, Repack and Save" was conducted in our 10 Milwaukee corporate stores plus two stores in Cedarburg and West Bend. The test period was from June 26 to August 19 for a total of 8 weeks. (The stores still continue to promote the program with their signs and merchandise displays.)

This program generated only a very slight impact on sales (see table). Between the milk, eggs, and plastic bags, our weekly sales were running about $8,000 per week for all stores, or 1 percent of total. Store managers were cautious, but 10 out of 12 advised that we continue the program. Customers using the program definitely favored it.

Almost all store managers seemed convinced that the program will become successful with more advertising, more in-store promotion,

SUMMARY OF STORE SALES

Store	No. gallons [illegible] milk per week	No. [illegible] per week	[illegible] bags [illegible] per week	Amount [illegible] per week	Plastic bags [illegible]	Avg. sales [illegible] per week
[illegible]	[illegible]	[illegible]	[illegible]	$ [illegible]	[illegible]	$ [illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

and more customer learning time. They felt a need to shift away from the traditional ad page to sell this program in the marketplace.

The opening press release, along with an interview in Milwaukee with two television stations, was extremely successful in launching the program with the public. Two things stand out with our release:

1. The consumer surveys show nearly 40 percent of our customers learned of the program from the television and newspaper releases.

2. Both the television station staff and the newspaper reporters and editorial writers were excited by the program. Channel 6 gave it 4½-minute coverage during the noon, 6 pm, and 10 pm news hours. The Journal carried a staff editorial praising Red Owl. The Sentinel carried an extremely complimentary feature story. The program was newsworthy and timely to the media.

Consumer attitudes about the program followed along with many of the checkers' comments; customers were generally very complimentary about the program, whether they were using the program or not. It was interesting to note that of the 22 nonusers surveyed, 9 indicated they liked the program. Of this group, it is also noted that there was less employee encouragement to the customer to try the program.

Mal Anderson was requested to furnish comments on our advertising of this program (see Appendix), if assigned to "make the program really go in the market." His comments do coincide with the thinking of our store people and seem appropriate for consideration.

The reusable plastic bag did not perform in quite the way envisioned.

1. The bag definitely did not sell well. By the 10th week, sales were typically running from 5 to 25 bags per week at a store depending upon size of store, etc.

2. The strength of the bag required continual "selling." People just did not believe it to be adequate.

3. The plastic bag became too much a symbol of the program. The bag was not put in perspective with other component parts of the program; it was probably looked upon as the whole program by many of our customers. Even one of our store managers became distracted by the bag and away from the program.

Conclusions from the 8-Week Test

1. The program to "Bring 'Em Back, Repack and Save" is mechanically sound. It works well for all types of shoppers at little or no extra store cost.

2. The program is dependent upon advertising to a very large extent. The program needs much media coverage to attract shoppers to the system, and to accomplish this objective in a given market, possibly as much as $50,000 would be required beyond the normal expenditures.

3. Once "hooked," a customer would stay with the program with good probability, but would need constant reminders to do so. Introductory advertising would taper off, but reminder techniques would *have* to be used.

4. The program seems more store-dependent than customer demographic-dependent, i.e., a store that has enthusiasm for the program will fare better with customer groups of most types, than a store that lacks enthusiasm will fare with a more environmentally concerned customer group.

5. In-store signing and consumer information materials are essential components and probably can't be overdone. Both the employees and the customers will find these materials fortifying their enthusiasm.

6. The program is definitely timely. This does not mean, however, that the timing for Red Owl is now. The timeliness is evidenced by the media response to our release, by the conversation still taking place about it at store level, by the nearly 40 percent of persons surveyed discussing the program outside our store, and by the ease with which the program was comprehended by the public (only 7 percent had difficulty at first). National attention focused on the program is also indicative. *Businessweek* will carry the story and *Chain Store Age* is running a feature story on it.

7. The program can build sales. It appears most unlikely that the program could have a negative effect. Therefore, any effect at all would be a plus to sales.

8. The program probably does not have of itself the kind of strength needed to really turn a store around once its sales begin declining; only 5.7 percent of the program users were not regular shoppers at Red Owl. Whether these persons convert to become regular customers of ours is unknown but, clearly, new customers did not flock to the stores to join the program, even during our opening 2 weeks following excellent media exposure in the newspaper and on television.

9. The program has its greatest appeal because of the economic savings, particularly among the shoppers of large families. Unless the economic savings are in some way felt, the program gets weak.

10. Much "free publicity time" is now available to us with the media in Milwaukee. This would be most likely in any of our markets in which the program was tried "so long as we were first."

11. Environmental organizations, along with interested governmental departments, would support the program.

In conclusion, the program should be looked upon, in the short range, as one of medium investment, low risk, and low to medium return. In the long range, however, the ranking would be changed to one of low investment, low risk, and medium to high return.

RECOMMENDATIONS

It is recommended that the marketing program be redesigned along the lines of advertising recommended by Mel Anderson, General

Manager, Advertising, and introduced into the Twin Cities market (see Appendix).

All other corporate stores should begin to adopt just two items for their mode of merchandising: bulk eggs at [illegible] cents off per dozen if you repack your own, and grocery bags refunded at [illegible] cents each when brought back for repacking.

The program should be continued in Milwaukee with the sending of new sign kits, followup press releases that are now being requested by the media, and a special budget set forth from which our advertising department may develop media messages.

Expansion of the complete program to other stores does not seem wise, though timely. We should consider, however, exceptions to this recommendation upon the advice of store managers and district managers who may request the program for reasons of "store readiness." Future expansion to all stores should be considered at a later date.

The Consumer Relations Committee should begin the development of customer materials useful to stores, using all or just part of the program.

The Twin Cities market is recommended for this program with two very special business interests:

1. The curtailment of store expansion in the Twin City market requires investment in sound marketing programs to an even greater extent.

2. The Twin Cities are ready for this kind of program. The market has been sufficiently engrossed in consumer and environmental issues to be primed for this program.

APPENDIX: ADVERTISING REVIEW

During the [illegible]-week period, paid advertising to promote the program consisted of Monday and Wednesday ads in the *Milwaukee Journal*.

First Week: We broke with a full-page ad on Monday, June 28, depicting the shopping cart and saver bag with program explanation. This ad was accompanied by a shopper's saver bag coupon.

Second Week: No advertising.

Third Week: On Monday of the third week we repeated the theme, "We'll Put Cash in your Pocket Today to Help Have a Little Bit of Tomorrow." Again, we explained the program and this time tied in with a returnable Coke special. The Wednesday ad carried a shopper saver bag coupon, along with a ½ page x 3 column "drop in" describing the program. In this ad we also tied in with the Coke ad still running.

Fourth Week: We repeated the "Cash in Pocket" theme with a miniaturized cart and program explanation. We tied in with returnable milk, a feature item. This ad was run both Monday and Wednesday.

Fifth Week: We repeated the "Cash in Pocket" theme with a miniaturized cart near the top of the ad with good location to the meat special, on both Monday and Wednesday.

Sixth Week: Both the Monday and Wednesday ads carried the "Cash in Pocket" theme with prominence near the top of the ad.

Seventh Week: Both the Monday and Wednesday ads carried a very small (8 inches x 4½ inches) repeat of the "Cash in Pocket" theme with picture of cart and five-step program explanation.

Eighth Week: We featured a Shopper Saver Bag coupon that was highlighted with the "Cash in Pocket" theme, on both Monday and Wednesday.

Following the 8-week period of advertising, Mal Anderson was asked to comment upon our ads and how he would approach the advertising of the program if requested to "really make the program go":

> The opening week was good with a full-page ad calling attention to the program, just as we did. But after that, I would run a series of ½- to full-page ads once each week on just one item or component part of the program until I had covered them all . . . these ads would close in on just the return of egg cartons to a Red Owl Store, and so on. This would have given us the opportunity to write the copy that is necessary to get the program across.
>
> Followup newspaper ads would not be entire program explanation ads, so much as they would be "merchandise highlights" that are a part of the program.
>
> Then, I would consider the use of billboard space--with each sign a graphic illustration of just one part or piece of merchandise in the program. This could be backed up with in-store signing, billboard repeats, etc.
>
> Lastly, I would like to see some 10-second I.D. radio and television commercials where we take just one part of the program and get in and get out with it . . . such as: "Bringing back your empty egg carton will save you 1 cents per dozen at Red Owl. Join Red Owl's customers who 'Bring 'Em Back and Save.'"

In summary, Mal commented that "We tried to explain the whole program every time we ran the ad until it simply got down to fine print. Using just the regular ad in the newspaper did not really expose the program to non-Red Owl shoppers."

FOR A TOTAL SYSTEMS APPROACH

Kenneth G. Van Tine*

I appreciate the opportunity of addressing this conference today on behalf of Owens-Illinois—a company concerned with the quality of our environment, as well as continuing to be a successful business enterprise. In the next few minutes, I would like to expand on the following thoughts.

First, packaging is not inherently evil!

Second, the restrictive beverage container issue has become entirely too emotional and symbolic.

Third, the packaging industry is constantly trying to improve the environmental profiles of its products.

Fourth, Owens-Illinois endorses a total systems approach to our environmental problems through resource recovery and recycling.

Through the late 1960s, and now the 1970s, both industry and government have hopefully developed some sophistication in dealing with environmental problems. We are still learning as evidenced by the recent difficulties with the catalytic converter. We should at least come away from the catalytic converter experience recognizing that attempts to control environmental problems in one area may actually aggravate the problems in another. It is this type of conference which we hope will avoid the compounding of errors in our national environmental policy. By bringing industry and government leaders together and sharing perspectives, we can cut down on the margin of error involved in managing environmental problems.

Today, we face highly interrelated social/economic/environmental problems which demand sophistication and the sharing of perspectives. Whenever possible, we should avoid the consequences of the "trial and error" approach to environmental problems—the "trial and error" approach is no way to formulate public policies.

This conference addresses techniques for managing the solid waste problem via source reduction, which will, at least in theory, reduce some portion of the solid waste stream.

The concept of source reduction is not new; as a matter of fact, it is a concept which has been internalized by the packaging industry for many years. As profit-minded institutions, packagers have constantly sought out new ways of reducing raw materials and energy costs. The business manager needs no legislative directive to tell him to minimize the materials used in fabricating his products. He is constantly trying to cut costs to remain competitive and, therefore, implicitly looks for new methods of bringing about source reduction. In this way, source reduction is internalized by the cost-conscious manufacturer. This is especially true in the packaging industry where competition for the least costly package can ultimately determine the success or failure of the business enterprise.

---

*Vice President, Owens-Illinois, Inc.

The focus of this conference is waste reduction as a means of managing the municipal waste stream, but what becomes more evident as our discussions progress is that the focus of this conference is not upon managing the overall problem of municipal solid waste, but is typically directed towards managing only the packaging component of the waste stream.

As such, we are no longer talking about a comprehensive and systematic approach to the solid waste problem—nor are we addressing a municipal disposal problem over the long term. Under the concept of waste reduction, we have directed our attention towards reducing only packaging waste which comprises merely a third of the solid waste stream. What is even more disturbing is that this afternoon we will further narrow our horizons and consider an even smaller portion of the municipal solid waste problem; that is, the percentage of solid waste represented by beer and soft drink containers.

Let me use the example of one-way glass containers to dramatize their comparatively insignificant impact in the overall solid waste problem. Similar arguments could be made for the other "one-way" container systems. When we consider all glass in municipal solid waste—windshields, doors, windows, bottles, jars, etc.—glass comprises approximately 9 percent of the total. For the moment let's dismiss the fact that glass is inert and recyclable. Of this 9 percent, only about two-thirds of 9 percent exists in the form of glass containers. Later today, we will discuss beverage container legislation which concerns "one-way" glass and would affect a still smaller percentage of the glass containers. Only 2 percent (approximately) of the total municipal refuse exists in the form of nonreturnable beer and soft drink bottles. In this perspective, then, legislation dealing with nonreturnable bottles addresses only a minute portion of the solid waste problem.

The objective of waste reduction is admirable, but ask yourself the question—"How have we shifted our attention from the overall problem of solid waste management to the issue of source reduction in packaging?" —and then, finally, "How have we come to focus on the restrictive legislation of beverage container systems?"

The emphasis placed upon the packaging industry and beverage container systems in our waste reduction agenda implies that these packages are wasteful. Perhaps it is packaging's visibility in our way of life which makes it seem a logical starting point for cutting out whatever fat exists in the composition of municipal waste. I would argue that it is the very visibility and prominence of packaging which indicates its importance to our way of life. Though it must bear some criticism, the benefits and contribution of the packaging system should not be evaluated within the narrow context of a single environmental issue, in this case, the solid waste issue. In this context, we end up devoting our attention to what represents but one stage in the overall packaging system; that is, the final stage, disposal.

But what of the other equally important stages in the distribution cycle? The other stages in our distribution system are highly automated and involve an interdependent matrix of producers, manufacturers, wholesalers, and retailers. Besides serving a variety of functions for each member of the distribution system, the main job of packaging is conveying the product safely and efficiently to the consumer. These stages and benefits of the distribution system are largely overlooked.

We have also overlooked the fact that our packaging and processing industries actually help in preventing waste. In Florida, for instance, the packaging and processing of 100 pounds of citrus products in fiber cans generates 10 pounds of leftover pulp, peels, and other unusable raw materials. Of this 10 pounds, 9 pounds are then recycled in the form of byproducts, for example, cattle feed—leaving only 1 pound of solid waste to be disposed. Instead of the city of Washington handling the pulp, the orange peels, and the spoiled fruit, packaging's rapid handling and centralization permits the utilization of these byproducts. This is a positive example of waste reduction.

Packaging is not an empty can or a discarded bottle. It is a system which provides many benefits in transporting the product from the farmer and manufacturer to the consumer. We cannot simply think in terms of empty cans, bottles, and other packages, because the product that was once contained in those packages is the real focal point of the distribution system. Yet, this conference concerns itself with the empty tin can and the empty gum wrapper, and once the focal point, the product, is removed from these packages, how can we rationally evaluate their value to the overall distribution system?

The packaging industry is not a grand scheme to inundate the United States in trash. On the contrary, it is a system which adds greatly to our overall quality of life. Packages perform a variety of functions which include containment of the product; protection of the package contents; apportioning and dispensing; sanitation; convenience; communication; and most important, providing a low-cost and efficient means of supplying consumer needs.

These are among the many benefits of packaging likely to be omitted in any discussion of waste reduction. The contribution of the packaging system cannot be measured in pounds of trash! If legislation is enacted to reduce the packaging portion of municipal solid waste, there is no guarantee that municipal waste will be substantially reduced because waste would be created in other areas. Nor is there any guarantee consumers would accept living in a society with fewer products, higher food costs, and fewer of the benefits we have already realized.

The gloomy inflation picture that we've received over the past few months has prompted many government leaders to accent the positive. We hear that Americans spend comparatively less on food than most people in the world. We take pride in the fact that only 4.8 percent of our population are able to feed this nation and other parts of the world as well. We should be proud, but this phenomenon is not only due to the industrious farmer. It is also because we have an efficient food distribution system and the packaging technologies to insure that what is grown in the fields ends up on the table. The importance of packaging's role in our economy and society is, in this conference, overshadowed by the more dramatic issue of solid waste.

Packaging is important to the economy. Besides being the nation's largest employer and generating 10 percent of the value of all finished goods, packaging actually cuts down on waste while providing for a low-cost, efficient means of distribution.

Packaging is important to the consumer. A product's life in the marketplace has historically been determined by consumer demand. Demand in the marketplace reflects consumer needs, and restrictive packaging legislation will not only limit consumer choice, but also leave these needs unfulfilled. For example, in the case of one-way glass, our sales indicate a strong consumer preference for this type of container system. Returnable glass, on the other hand, has lost ground in the marketplace. These trends indicate the popular vote, if you will, of today's consumers. I question whether it is the prerogative of government to limit the consumer's choice while, at the same time, impose on him the increased cost of that interference.

The packaging industry has evolved in response to consumer needs. It has created products and developed technologies in order to supply consumer needs in a low-cost, efficient manner. The real problem that confronts this conference is that while our packaging and distribution systems have advanced, our disposal systems have not. Municipal disposal systems are antiquated and waste valuable materials and potential energy sources. Even though recycling and resource recovery are in their formative stages, they represent a significant effort to update our wasteful disposal systems. Industry and government are working hard to create efficient recovery systems, as you well know.

In the glass industry, Owens-Illinois has been recycling in-house waste glass for years as an integral part of the glass manufacturing process. Owens-Illinois initiated community recycling projects as early as 1968 in Bridgeton, New Jersey. Industry-wide glass recycling began in July 1970. As of the end of 1974, the glass container industry has recycled nearly 2 billion pounds of waste glass—the equivalent of 4 billion bottles which otherwise would have found their way into the waste stream. In addition to paying approximately $40 million to the public, recycling has also provided industry with a necessary supply of glass cullet. This supply of waste glass has allowed our industry to develop the capability of utilizing larger quantities and higher percentages of cullet in the make-up of glass furnace batch.

The increased use of cullet not only removes glass from the solid waste stream, but has led to some very promising prospects for source reduction in the glass manufacturing process itself. Indications are that the increased use of cullet carries with it some very significant energy savings as well as: (1) extended furnace life due to lower operating temperatures; (2) a substantially reduced need for soda ash and other ingredients; (3) lower air emissions from the glass furnaces.

The industry's ability to use greater quantities of waste glass has been largely limited by the supply of glass cullet available. The successful completion of the many municipal resource recovery facilities, now in the planning stages, will gradually alleviate this constraint.

Besides the responsibility of meeting consumer needs, Owens-Illinois and the packaging industry recognize their responsibility to create products responsive to the environmental problems of today. Let me share with you a few examples of our continuing effort to lower energy use and conserve raw materials.

The amount of energy and raw material used in glass manufacturing varies directly with the weight of the individual containers. Substantial source reduction can be realized, therefore, by designing lighter containers. Over the years, the trend has been to lightweight containers. I can assure you that the glass industry is aggressively pursuing even lighter versions of existing package configurations due to the competitive pressures in the packaging industry.

For example, Owens-Illinois developed the nonreturnable plasti-shield bottle in the early 1970s. When we compare the 16-ounce plasti-shield bottle with our best selling conventional 16-ounce nonreturnable, significant weight savings are realized. The 16-ounce plasti-shield bottle weighs 14-1/4 ounces, while the conventional bottle carries 21 ounces of weight. Thus, the plasti-shield package represents a 30-percent weight reduction.

The weight savings achieved when comparing a case of plasti-shield bottles with a case of conventional 16-ounce nonreturnables are dramatic. This weight reduction not only saves raw materials, but also reduces solid waste.

Along with the historical trend toward lighter containers, we have also experienced consumer preference for larger size containers. Owens-Illinois' introduction of the "resealable 'large sized'" container, in both returnable and nonreturnable forms, delivers more product to the consumer with less container. Therefore, a source reduction is achieved and at the same time, the consumers' needs are fulfilled. The resealability feature cuts down on waste and saves money because the consumer is able to save the unused portion of the product. Improving bottle designs is one way Owens-Illinois is reducing waste.

As a result of consumer cooperation, we are gaining greater flexibility in designing and manufacturing our glass packages. Better designs will not only lead to more functional bottles, but will also lead to improved source reduction. The bottle I am holding (T-top, metric) represents a unique design which will soon be commercially introduced as a returnable. A similar nonreturnable design is also being developed. The improved design will enable it to deliver a full liter of product, 1.85 ounces more product than the conventional 32-ounce bottle with an accompanying weight reduction of 15 percent. This is an example of positive source reduction.

These are but a few examples of how we are trying at Owens-Illinois to improve our packages, expand consumer choice, and at the same time improve the environmental profiles of our products.

In summary, I would like to say that the packaging and beverage container industries provide benefits beyond the scope of this conference, and have been, therefore, unrecognized in our discussion of solid waste. The efficiency of the American distribution system is unparalleled in the rest of the world. It is time to bring that same efficiency to the management of the solid waste problem. Cooperative industry and government efforts in recycling and resource recovery systems should aim at making our disposal systems the most efficient in the world as well.

We urge the members of this conference to treat the disease—not the symptoms—in the solid waste problem. Initiatives in recycling and resource recovery have made remarkable progress when you consider the short time in which they have been developed. We encourage more of this comprehensive, long-term approach to the entire solid waste issue, not simply directing our efforts at a relatively small portion of the problem.

Freely competing products, unencumbered by legislation, will not only serve consumer needs but will also provide for the lowest possible cost system of distribution. Source reduction will be implemented wherever possible by the very nature of the cost conscious and intensely competitive packaging industry. For example, Owens-Illinois' energy cost last year was up nearly 50 percent in spite of a 5 percent reduction in energy consumption. These costs make it imperative that source reduction, in its true manufacturing sense, be considered in every aspect of our business. Ladies and gentlemen, Owens-Illinois is concentrating upon source reduction. We know if we ignore these costs, we are violating one of the tenets of the free enterprise system, and such a violation can only lead to severe economic consequences.

The debate over restrictive container legislation has reached symbolic proportions. The real issues have been obscured by the emotional pleas of both sides. The beverage container industry has become the "straw man" of numerous environmental issues, but there is no way that the total disruption of our distribution system can be justified by the marginal environmental benefits gained. In the spirit of waste reduction, I suggest we not waste our time in continuing the debate on this type of legislation, but concentrate our energy upon constructive programs which provide for a total systems approach to our environmental problems.

INDUSTRY'S COMMITMENT TO WASTE REDUCTION

Eric A. Walker*

I find this a rare treat because never before have I addressed a subject on which there was total agreement. In this instance, however, I can tell you with full confidence that I speak for all of industry and for everyone in this room when I say that we are against waste. But as we all know, that doesn't dispose of the subject.

There are almost as many ideas on how to reduce waste as there are people in this room, and that makes the problem extremely difficult to attack. But resolving differences is not an overwhelming task. We do it all the time. I feel certain that we share a common goal: All of us want to do something about needless waste in this country. That's an excellent place to start. And I believe that industry is prepared to make a definite commitment to solving the solid waste problem in a way that will hold waste to a minimum.

There is a broader issue that concerns all of us in this room, something that affects our ability to resolve all issues of public policy that influence the working of our great economy. It is something that requires commitment—not just industry's, but that of every segment of our society—the commitment of government, and of the special interest groups as well as business. In the simplest terms, this is the need for communication and cooperation to replace confrontation as a way of life.

This is basic to the solid waste problem—and to all the others that have been escalated into national issues. There must be commitments by individual industries, by individuals in both the legislative and administrative branches of government who enact and apply the laws, rules, and regulations; and by special interest groups to make our political economic system work in a way that can cope with the mounting list of very complex problems with which we are confronted. Certainly inflation, unemployment, lack of capital to expand our industrial plant, and our loss of credibility as an international power are of utmost concern. Frankly, I do not consider waste disposal among the most pressing problems we face, but if we can resolve the waste problem there is hope we can handle the others. Unfortunately for the citizens of this country, any serious attempts to deal with the waste problem are suffering in one way or another due to the current feverish debate over counterproductive, piecemeal attempts to attack the problem. I'm referring to the countless number of legislative proposals that would ban, tax, or in some way restrict a variety of products that end up in whole or in part in the solid waste stream. If we do not come to grips with this paralyzing inaction soon, I very much fear that the whole American experiment will be just one more floater in the solid waste stream.

---

*Vice President, Science and Technology, Aluminum Company of America.

The reason solid waste management still is an issue rather than a collective effort is because there is no mutually-agreed-upon approach to solving the problem by government, special interest groups, and the private sector. Obviously, we're not communicating well or the problems would be pretty well in hand by now. The reason why we're not communicating is that we have thus far failed to establish a [illegible] of trust within which we can work together earnestly to solve the waste problem.

I sincerely believe that if we do not take the time now to examine our attitudes about each other and to establish real communication and trusting working relationships, this conference and the effort it is trying to further will be just another exercise in futility. It will simply serve to further confuse and delude the public, which already has become suspicious that this political economic system—Congress, the Administration, business and voters—can only move from one disaster to another.

I don't believe the situation is at all hopeless. There have been many times when business and government have worked effectively toward a common goal. The atomic age was born of such an effort. We knew our goals, and everyone was too busy to throw up roadblocks. Polio and other dread diseases have been conquered through team effort by government and the private sector. America was electrified in this way, a common goal and a joint effort; and Neil Armstrong stepped on the moon because the Federal Government and the private sector developed a relationship of great strength.

Here is a good current example of this effectiveness in reaching an accord on a smaller but important problem. The six major industries that account for 70 percent of total energy use by U.S. industry, got together with the Commerce Department and the Federal Energy Administration in a cooperative effort which, in less than a year's time, established meaningful goals to emphasize energy management, and thus conserve significantly large amounts of energy. These industries that have worked historically at using energy efficiently now have made a serious commitment to specific energy saving goals. My industry, for example, during the past three decades has cut nearly in half the electrical energy needed to produce a pound of aluminum from the ore. And that power consumption will be reduced another 30 percent with the new Alcoa smelting process, which will be operating late this year with the startup of a new plant in Anderson County, Texas. To this effort, we have added specific goals for total energy conservation by 1980.

Unfortunately, there are many examples of the failure of government and the private sector to make their partnership work. Mass transit still is stuck in a traffic jam of bickering. Urban renewal is in desperate need of renewing. Atomic power developments are stalled in the courts and regulatory red tape. Currently industry is struggling with a whole raft of enviro-energy programs, one of these being the nonreturnable container controversy. And the public is paying the price for these failures.

When we sort out the shining examples of success and the abundant pile of failures, a few things are apparent. Common to all the areas in which the private sector and government have succeeded are: (1) a common, essentially universal sense of need and national purpose; (2) effective leadership by officials inspired by public need and sensible laws rather than political or personal expediency; (3) commitment by all parties based on agreement as to objectives and rules; (4) useful communication, not shrill recrimination; (5) facts that reveal the true costs and consequences of various courses of action as they affect the individual citizen and our economy.

Much is needed if any issue of national scope is to be resolved to the benefit of the public. The attempt to manage solid waste is one of these. It can go either way. We can continue to bicker and muck around, or we can get together and solve the problem in a manner acceptable to government, workable for industry, and desirable for the public.

Judging by the present course, I would say that we're headed for another failure. Thanks to the public display of our adversary relationship, the waste issue has surfaced in the public mind as another crusade by busy politicians and bureaucrats against obstinate and heartless big business. Some people seem to think the U.S. trash pile can be legislated away piece by piece, beginning with the beer can. Once more, a complex problem has been oversimplified, raising false hopes in the public mind, and destined to further delude the country by showing the inability of government and business to solve problems together.

Frankly, while it can reasonably be argued that solid waste is at the most a State, if not purely local, issue, it is our view that both the Federal Government and industry have appropriate, supportive roles to fill in coming to grips with the solid waste problem. The technology of resource recovery is in its infancy, its economical viability is yet to be proven, but there is a great deal that can be done to accelerate its development.

The aluminum industry, working with the packaging and beverage industries, has been intensely engaged in developing both solid waste recovery systems and voluntary reclamation programs. I am sure you are aware of the extensive can recycling effort we have mounted. What started out for us as an effort to demonstrate the high scrap value of our metal and help with the litter problem has turned out to be an economically viable arrangement for aluminum producers. Last year Alcoa increased its collections to three-quarters of a billion all-aluminum cans, nearly three times the number handled the previous year. Redeeming those cans, at $300 a ton, put approximately $5 million back into consumers' pockets and saved 95 percent of the energy needed to produce an equivalent amount of virgin metal from the ore.

Just down the road from this hotel, there is under construction a test facility for resource recovery that will process refuse at a rate of 20 tons an hour. Within a year or so the facility, established by the National Center for Resource Recovery, will extract aluminum, steel, and glass and burn the combustible fraction to produce electricity. Alcoa is lending a sophisticated, new device to this project that will extract the aluminum from the solid waste stream. Our engineers and metallurgists will assist with the startup of the so-called "aluminum magnet" and will develop procedures for utilizing the recoverable aluminum fraction.

We are highly optimistic about these early efforts, as well as about some of the other projects getting started in St. Louis, New Orleans, Ames, Iowa, the State of Connecticut, and other parts of the country. But we know also that industry does not have all of the answers and that to encourage the growth of this new technology will require public support and commitment.

Establishing resource recovery nationwide would mean that industry and government agencies would have to evaluate recoverable tonnage, invest large amounts of capital in facilities to accept and process scrap, establish specifications for recoverable materials, and develop useful product applications for the recycled materials in volume markets most likely to remain constant. My company is well along with such an effort, recognizing that about 1.5 billion pounds of aluminum could be recovered from the solid waste stream and recycled annually.

A very necessary role for government, primarily State and local government, would be to help minimize the risk of major capital investments. The Federal Government could be invaluable in spreading the benefits of developing recovery technology. It could share the cost of full-scale commercial facilities that recover all valuable fractions and energy, and thus help stimulate replication of successful projects throughout the country.

The task is formidable, but the prize is substantial. I would like to challenge your imagination somewhat with the potential of nationwide waste recovery. The economics certainly make sense. I wasn't sure just how much until I saw the results of a cost benefit analysis of resource recovery systems in the major metropolitan areas of the United States which was done for Alcoa by the research firm, Franklin Associates. The data is based on studies done for EPA and an analysis commissioned by one of the Midwestern states. The Alcoa-sponsored analysis indicates:

1. A total of 250 facilities would process virtually all the solid waste of the 150 major metropolitan areas of the country.

2. Facilities built to recover materials and use the combustible fraction to generate energy could operate at a cost less than the composite average cost of incineration or urban landfill.

3. Value of the recoverable portion of aluminum, glass, steel and paper, and the energy from combustibles would amount to more than $1 billion a year at current prices.

4. Construction of the recovery facilities would employ some 10,870 workers for 10 years, and operation would create 25,700 permanent jobs.

5. Total savings of disposal costs, recovered materials, and energy produced would amount to $3.6 million a day at current prices; in other words, each of the 220 centers would save the public an average of $16,000 each day of the year.

According to our study, 40 percent of this nationwide recovery operation could be on stream and operating by 1985 and all of it completed by the year 2000.

Of the various alternatives proposed for dealing with solid waste, resource recovery makes the most sense to me, to my company and, I believe, to the vast majority of American businessmen. It would reduce litter although the real solution to that problem lies elsewhere. It would expand our energy resources although only to a tiny fraction of our need. It would solve neither of these problems, and should not be undertaken for these objectives. Its really significant benefit will be to make an enormous contribution to waste reduction and resource conservation. And it would, of course, solve the problem of disposal. Developing this potential is a challenge that the private sector could handle well—with the help of government.

As I see it, industry and government can continue to square off and shout with special interest groups egging us on from the sidelines, and the results can be predicted with 100-percent certainty.

Or we can get together and succeed. We must do so if we are going to solve the solid waste problem. And much more vitally, we must do so if we wish our political-economic system to continue. My commitment and industry's commitment is to make it work.

Beverage Container Legislation

THE REFERENDUM IN DADE COUNTY

Harvey Ruvin*

Many of you probably already know that in Dade County there was a referendum on a proposed ordinance that was almost word for word the same as the Oregon bill. Prior to that referendum I had introduced the ordinance to the Dade County Commission. We have a rather unique form of government, probably closer to that of the city of Toronto than to that of any area of the United States. It's a metropolitan form of government; it's totally home rule and has been a leader in the past in terms of consumer legislation and legislation that our State legislature wasn't adopting. We thought we were a large enough area, not only 1½ million population but nearly 2,500 square miles, which is larger than three States in the country. A major soft drink and beer market, it was really a rather logical place for the issue to be framed. We had passed laws to ban the sale of detergents above a certain percentage of phosphate content as well as other types of ordinances that have seemed to benefit some of our communities.

My first involvement with the beverage container issue was as Vice President of the Tropical Audubon Society back in 1970. The Tropical Audubon Society in the southern part of Florida is the second largest Audubon chapter in the country. We were involved in lobbying for a State law back in 1970. Of course, at the time we were easily dismissed as communistic and probably as some wild-eyed form of anti-free-choice effort. The issue gained a little momentum after the Oregon experience. About the time I was elected county commissioner, the Oregon law came into effect, so we had about 1½ years of watching that experience before the issue was finally introduced before the Dade County Commission. A great deal of staff work and a great deal of advance planning were done so we would have a good hearing.

I'd like to say at this time that the best part of the whole experience has been the contact with extremely worthwhile people. Eileen Claussen is an incredible person as far as I'm concerned. Not only has she done her job with integrity and forthright commitment to idealism, but she's done it under, most people would say, highly difficult circumstances. I think that really is the test of a person. Whatever she does from here on out, I'm certain it will be valuable.

Eileen came and testified. We had people from Oregon; we had Bill Moore, the enforcement officer in Oregon; we had a bottler from Corpus

---

*Dade County (Florida) Commissioner.

Christi, Texas, who made a trip to Miami to testify; and Don Waggoner, Oregon Environmental Council, came as well. The other side certainly brought in all the experts that they could, and I think we probably had one of the finest factual hearings on the issue anywhere. The people who testified at the congressional hearings told me that there was really a much more outstanding debate of the issue for us than anywhere they had seen. It was some 8 hours of hearing, and it contained a great deal. Unfortunately, the coverage of that hearing never touched upon the debate or any of the testimony that was offered because of the rather unusual ending that the meeting had.

The Dade County Commission has nine members. At the time we had two vacancies; one member was absent, so there were six people present. As the meeting (a special one set for that day) progressed, we learned that two of them would not be able to vote because of conflict of interest. One was an owner of a convenience store chain; the other one, a fine man by the name of Ed Stevenson, represented AFL-CIO in Dade County. Although they announced their conflict of interest, they didn't leave the meeting that was called especially for that one item. I was delighted when the final vote was taken. Of the four people who could vote, we had won three to one.

However, the decision was handed down by our county attorney, which I think was a proper one based upon our charter and the laws existing in Dade County, that we had to win by a majority of those present, not those voting. So at that point, we were in the middle of a rather intense finger-pointing situation. We were losing the substance of the issue, what really should have been discussed—the pros and cons of this law. Instead we were debating the procedural irrelevancies. I frankly felt at that time that the only way to go was to put it to a public vote. We placed it on the November ballot.

There were 2 months to prepare, and a whole series of debates and radio programs took place. We argued the facts as we saw them. The reports as I had read them led me to the very strong conclusion that there were certainly cogent arguments favoring the law and that most of the other arguments against it really didn't have any weight once you cross-examined them. I tried to be objective. I read all of the studies, I read everything I could read. I sent out a package when I introduced the legislation, some 300 pages of background material. We argued a lot—as Mr. King acknowledged a few moments ago—that the figures of the EPA regarding energy certainly show that we could save a great deal of energy, perhaps enough to supply all of the electrical needs of a population of 8 million in 1 year. That was a significant argument in favor of the law.

I think the record clearly shows that the law—this is really a byproduct of the law—operates as a tremendous deterrent to litter. The material waste seems to me to be the most obvious. There are many more arguments. We felt the facts showed that actually increased employment results rather than a decrease. While some skilled jobs would be lost, there would be other jobs added—truck drivers and warehousing and retail clerks. The Oregon experience, certainly, showed a net increase in employment and we would probably have the same kind of impact on our employment.

The debates were really very interesting, and I think that up until 1 or 2 weeks before the election, we had a fairly good, high-level discussion taking place in the community. The 8 or 10 percent of the people who read the newspapers and watch television had in fact heard both sides. There was no question that all the newspapers—the weeklies and the local newspapers, as well as the two major ones, the dailies—endorsed the ordinance. Then we got down to the last week, and I really don't want this to sound like sour grapes because I feel that we had a victory even though we lost, and I think I can demonstrate that. It was a rather interesting campaign, and all I can say to you is that anybody interested in the evaluation of the Dade County experience, the referendum on the issue, please let me have your name and address, and I'll send you a report issued by the FAU-FIU Joint Center for Environmental and Urban Problems, which contains an evaluation of the election returns and of the whole campaign experience. In the last week of the campaign, we found ourselves facing an impressive avalanche of media blitz.

As a politician, I really stood back and admired the weight of the opponents' campaign because it was highly effective. There wasn't a can of beer sold in Dade County in the last week that didn't have a red, white, and blue sticker on it that read, "Vote Against Forced Deposit Law and Keep Freedom of Choice." The bottom message was that this law, if enacted, would raise the price of a six-pack 30 cents. Interestingly, the logo was very reminiscent of the one used by the anti-busing constituencies about 11 years before. It was red, white, and blue, the same shape, and had the same kind of phrasing.

By Thursday before the election I frankly knew that we had gone down the drain. That was the day that the radio started. The ads were on eight stations, every 20 minutes on each station, from early in the morning until late at night. The ads were really beautiful: "Hey, do you remember those long lines at the gas stations? Well, you haven't seen anything yet. Wait till you get those long lines at the grocery stores. Just like the government did it to you then, they're going to do it to you again." They hammered very hard on the cost factor. There's no doubt that a great majority of the people who voted against the law were under the impression that 30 cents would be an increase in price rather than what it was—a deposit.

Dade County is a community where more than 90 percent of the beer sold is in throwaways and only one of the five major chains sells it in returnables, and that is an off-brand. Industry argued that there was an overwhelming 99 percent consumer demand for the throwaway, so consumer demand should really be the ultimate test. Well, the vote was 57.3 to 42.7, and it dispelled that argument. It showed that nearly 43 percent of the people in Dade County were voting for this law. Certainly it proved a 99 percent consumer demand is really not consumer demand but chain store demand. That is the demand the beer distributors look to and assess. When people go to buy beer, they'll buy what's available.

The election returns show that while we did rather well in the higher education areas, we really did rather poorly in the lower education, lower socioeconomic areas. I think the direct message from stores appearing on all shelves in the last week was phenomenal. Little signs read, "We are trying to keep the prices of these drinks down. So help us by voting against the Forced Deposit Law." Attached to the pushcarts in all the stores was the same sign.

Television was really devastating. Winn-Dixie went into a separate campaign, but the main one was waged through an organization called the Dade Consumer Information Committee. The total amount of money spent as shown in their reports was $230,000, the same amount we showed in our spending reports. I estimate that they spent closer to $400,000 or half a million. Things that they really probably didn't have to show were not included in their reports. For instance, while the contributors to the committee—all national corporations such as Continental Can and Bethlehem Steel—were limited to $1,000 contributions, every stockholder in Dade County of these 280 corporations received letters saying that if this law passed, his dividends would probably go down.

So, if you're going to have a referendum, you're going to have to fight this kind of opposition. I think they had a right to do it. But I think they're utilizing arguments in the most inflammatory way, and they are seeking certain constituencies in those kinds of elections. If you get into the same kind of situation, you should try to reach those constituencies as well. I found it very hard to do. We did get some free response time under the Fairness Doctrine, but the ratio was such and the level that they were spending was such that we were really avalanched. I think, however, we did end up with some positive results.

On the eve of the election, one interesting thing was done. Dade Consumer Information Committee called a press conference and announced the flip-top can. As you know, part of the Oregon law and part of our plan would have been the banning of the pop-top part. They showed this flip-top plastic attachment, which wouldn't detach from the can, with the statement that you should vote against the law because half of it is obsolete, and we're going to come out with these flip-tops as soon as possible. I did get from them a total commitment to have that in effect in Dade County by August of this year. I haven't seen any in Dade County yet, but by August it's going to be apparent that either they have fulfilled their commitment or apparent that they haven't. So that I feel was a positive step.

I think we raised a lot of consciousness, and that's what I think I'd like to end on. I respect Dr. Walker, and I'm sure that everything he said was well motivated. Just in the couple of hours I've been here listening to people, I seem to sense an attitude that the industry is saying, "Let's get together, let's not be inflexible, and let's start being conciliatory." And I think that there's a healthiness about that. But I would say to those of you in the audience who feel strongly about this and are convinced that you are right because I think that you are right, don't give up. Keep the pressure on. Fight as hard as you can because in the long run I think that the validity of this approach is going to become more apparent to more people and the truth of it will be borne out. What I felt after my experience was that if you peel it all away, what we have is an industry saying to us, "Look, we have worked hard to develop a system. We've structured ourselves around this system—the can, the whole marketing process that we've built." That's what they're saying to us. I think they ought to be structuring themselves in the best interests of society and the savings that could be accomplished in ending energy waste and material waste.

A MORE POSITIVE STRATEGY

Henry B. King[1]

One of the practical results of the environmental movement a few years ago was the requirement for an environmental impact statement on Federal and other public projects. This was designed to insure that careful and reasonable thought would be given in the planning stage of a major construction effort, military system, or other program which might upset or infringe on our delicate ecological balance. Lately, however, some environmentalists have proposed programs, laws, and actions which do not consider the effect on another, very delicate balance in our world—the economy.

THE CONTAINER LEGISLATION PROPOSITION

As you well know, there are and have been many proposals at local, State, and Federal levels recommending a ban, tax, or mandatory deposits on nonreturnable beverage containers. Such proposals aim at reducing litter and solid waste. It is alleged that these actions would save in energy use, increase jobs, and result in dollar savings to the consumer. Proponents of such measures point to examples of "success" where such laws are in force. I would propose, therefore, that we review the experiences gained so far and the pertinent facts dealing with energy, costs, and employment. I believe my introduction of these factors would then become relevant to a need for an economic impact statement surrounding these issues. This, I believe, should lead us to look for a better way, an alternative.

OREGON'S EXPERIMENT

No one quarrels with the need to reduce the blight of litter or cut down on waste filling up scarce landfills. In fact, I like to think all Americans are environmentalists. The main difference among us is how we view the methods to attain the desired goals. The Oregon legislature felt that a law banning the nonreturnable beverage container would indeed significantly reduce litter and supported the measure. Let's see what the

---

[1] President, United States Brewers Association, Inc.

Oregon law did.

The official Oregon report on results of the first year of that State's law showed a 10.8 percent reduction in litter. The Applied Decision Systems report, contracted by the State, showed beverage-related litter reduced, but all other litter increased. More recently, facts have shown that beverage-related litter actually may be in an upward trend. For example, the Oregon State Highway Department litter survey for June through August 1974 showed that beverage container litter increased 59 percent from the year before and all other litter increased 8 percent!

This is the tragedy of the Oregon law which resulted in a loss of skilled jobs, cost the beverage and container industries between $6.8 and $8.8 million in pretax earnings, and cost the consumer. The Oregon State Highway Department, it should be noted, abandoned its survey following its September 1974 pickup.

The ADM study also showed that Oregon had a 10.7 percent increase in cleanup costs and that malt beverage excise tax collections were down by $17,000. The consumer found his choice among the competing packages severely restricted. Due to the standardized container given preferential treatment by the law, foreign and specialty brands lost half of their former share of the Oregon market.

William E. Trebilcock, General Manager of Pacific Coca-Cola Bottling Company, said, "Per capita consumption of packaged soft drinks experienced an unprecedented decline during the law's first year. . . . As of November 1, 1973, our wholesale and consumer prices on returnable bottle soft drinks in Oregon were substantially higher than any other domestic subsidiary of the Coca-Cola Company." He also pointed out that Chicago consumers, for example, are paying 10 percent less at retail than Portland's *wholesale* price.

The ADM study made a significant, final observation: "A final note must be added to those who will extrapolate Oregon's experience under its Minimum Deposit law to other areas. One must consider the similarities and differences of the markets, consumer attitudes, and industries in both areas in the process of translating Oregon's experiences to other regions."

More important, there was no progress toward closing dumps or toward achieving resource recovery. In my opinion, the human energy and initiative which were dissipated in a futile attempt to reduce litter should have been directed at these higher priorities, closing dumps and achieving resource recovery.

ENERGY SAVING CLAIMS

Statements have been made by proponents of container legislation that would have us believe a great savings in equivalent gallons of gasoline would result if non-returnable beverage containers were prohibited. They attempt to support these claims by assuming 10, or even 15, trips for a returnable bottle. I believe it is essential to put these claims in perspective lest we miscalculate what may be attainable.

An all-returnable system would result in some reduced use of energy in the manufacture of a single package, the returnable bottle. But, let us look at the tradeoff factors. Each beer and soft drink truck can carry only 70 percent of its capacity in a returnable system. This means an addition of at least 40 percent more vehicles to the fleet would be required. That's more gasoline consumption, not less. I say "at least" because the trucks cannot go out fully loaded; they must save room for the empty bottles picked up en route. When that many more trucks are added to the streets and highways, you not only burn more gasoline, but invite many more obvious problems.

Any claim of 10 to 15 trips for a returnable bottle is highly optimistic, especially in urban areas. Due to the weight and size characteristics of a returnable bottle, we may well witness an increase, instead of a decrease, in container refuse.

Any energy savings in substituting returnables for nonreturnables could be greatly lessened by increased costs in shipping the substantially heavier returnable. This is particularly true in areas of critical fuel availability. Also, increased energy use is required in washing of returnables. Finally, consumption of energy for the manufacture of nonreturnable beverage containers amounts to less than four-tenths of 1 percent of our total energy usage. In other words, tradeoff factors will make any savings minimal at best.

COSTS AND EMPLOYMENT

I think we have seen so far that restricting the nonreturnable beverage package does not do the job it is intended to do. The results in Oregon show this; over 300 jobs were lost as a result of the law. Skilled jobs. If that was the result of restrictive container legislation in Oregon, what would happen in many of our industrial States? A more recent example of the results of the Oregon law was the decision announced last month by National Can Corporation to close its plant in Yakima, Washington. Company officials said that the Oregon law almost totally eliminated the plant's soft drink container business. As the ADL study pointed out, extrapolating the Oregon experience to other States might be a mistake. I think the ADL observation is very valid. A restrictive container law will not accomplish its intended environmental objectives and yet poses severe negative economic consequences for any State. We can see product costs go up, and unemployment compensation costs will increase with a corresponding reduction in income and sales tax revenues. The biggest cost, of course, is the human and social one attributed to job loss. I.W. Abel, President of the United States Steel Workers, estimates 45,000 to

80,000 jobs will be jeopardized in the steel, aluminum, and can manufacturing industries by a national "bottle law."

AN ALTERNATIVE

The Environmental Protection Agency recommends adoption of various conservation strategies: (1) energy recovery; (2) recycling; (3) improved solid waste collection; (4) source reduction.

The U.S. Brewers Association strongly believes that the first three strategies represent positive steps forward. However, EPA's source reduction strategy is a step backward and could easily lead to a serious decline in our national productivity. The question is not whether we should develop a national resource (energy) recovery and recycling system and the most efficient solid waste collection systems, but rather, whether once we develop these systems, does the EPA's approach to source reduction make any economic sense?

Peter W. Hirsh, President of the Hirsh Brewery Company and Chairman of the Board, USBA, has said, "The development of a nationwide system of resource and energy recovery and recycling systems would accomplish our national energy and materials conservation objectives in a far more economically sound manner than any attempt to achieve these objectives through source reduction by eliminating nonreturnable beverage containers."

Policy recommendations on this subject generally conclude with a view toward two combinations of "strategies": (1) to implement only resource energy recovery and recycling or, (2) to implement both resource energy recovery and source reduction.

Dr. Robert S. Weinberg of R.S. Weinberg & Associates, St. Louis, Missouri, a noted analyst, has said, based on published reports, an investment of $3.5 billion (1977-1978 dollars) will be required to build the plants necessary to process the solid waste generated in each of the standard metropolitan statistical areas considered in the EPA report. It is also estimated that the malt beverage and soft drink industries would require $6 billion in new capital investment to return to a returnable-bottles-only production distribution system (Table 1).

USBA contends that the capital investment required to produce the net environmental gains offered by the source reduction strategy, once we follow the resource energy recovery and recycling strategy, is excessive and could not be accepted on the basis of any reasonable economic criteria. An investment of approximately $8,000 for the capital equipment required to support the resource energy recovery and recycling strategy will produce an energy "savings" equivalent to one barrel of oil per day. Therefore, the $3.5 billion investment would yield 175,000 barrels of oil per day. To achieve the same energy "savings" from the source reduction strategy, combined with the resource recovery strategy, would require a capital investment of over $61,000, over 7.3 times as great as resource recovery strategy alone (Table 8). Thus, the investment of $6 billion to return to an all-returnable system would produce only 41,000 barrels of oil per day. Clearly, the net contribution of the source reduction strategy is quite small when compared to the required additional capital investment.

A dollar "invested" in the resource energy recovery and recycling strategy is not only more than 7.5 times more productive as far as energy "savings" are concerned, but more than 41 times more productive in terms of reducing solid waste disposal requirements; [illegible] times more productive in terms of conserving aluminum; [illegible] times more productive in terms of conserving ferrous metals; and [illegible] times more productive in terms of conserving glass.

Once we accept the resource energy recovery and recycling strategy, the source reduction strategy drops to a poor second. The former is the positive approach and the one which would provide our country substantial economic "dividends" for other more serious environmental and social problems.

The State of Connecticut has authorized $[illegible] million for regional resource recovery centers. It is estimated that by [illegible] that State will have saved $[illegible] million. Projected over urban America as a whole, our country might save $6 to $7 billion within the same time frame. These savings could be applied to other serious environmental or social problems. This is a forward approach.

We all need to support community, industry, government, and private efforts aimed at the more positive course of resource recovery and litter reduction. What we do not need are proposals to reduce litter which actually produce greater problems. The sound approach is to weigh alternatives and then proceed with a totally committed community effort. This is done by considering environmental needs together with economic and other considerations.

I believe that if our nation takes a forward position in resource recovery, we will witness a dividend, money that will be returned for more important environmental and other social programs.

The essence of good management and national leadership is to select the wise approach, the best approach. This is mandatory when the two approaches are in conflict and are counterproductive. Restrictive legislation is inflationary and wasteful—wasteful of our most precious resource—human energy. And every man-day or year lost through unemployment is a complete loss; it perishes forever!

The other alternative, resource recovery, achieves our environmental goals and our economic goals simultaneously and thereby provides a unity of purpose of all sectors—government, labor, industry, and the general public.

[illegible]

[illegible]

	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] [illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	[illegible]	–	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	–	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	[illegible]	[illegible] [illegible]	[illegible]
[illegible]			
[illegible]			
[illegible]	[illegible]	[illegible] [illegible]	[illegible]
[illegible]	[illegible]	[illegible] [illegible]	[illegible]
[illegible]	[illegible]	[illegible] [illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

EFFECTS OF REUSE AND RECYCLING OF BEVERAGE CONTAINERS

John H. Skinner*

Just 20 years ago almost all soft drink and malt beverages were packaged in refillable containers. Since then, population has grown and the consumption of beverages has increased but the use of refillable containers has decreased. For example, between 1959 and 1972 packaged soft drink consumption increased 76 percent on a volume basis, and packaged beer consumption increased 50 percent.[1] At the same time refillable soft drink bottle fillings declined 40 percent, while refillable beer bottle fillings decreased 38 percent. One-way beer container fillings increased by 119 percent, while one-way soft drink container fillings increased by a factor of eight during that period.

This increase in one-way beverage container consumption has resulted in an increase in solid waste generation. About 8 million tons of beverage container solid wastes were generated in the United States in 1973.[2] This represented about 21 percent of all packaging wastes and approximately 8 percent of all solid waste generated by commercial establishments, households, and institutions. Beverage containers are a rapidly growing segment of municipal waste with a growth rate of approximately 10 percent per year from 1962 to 1972.[3] Beer and soft drink containers also form a large and highly visible segment of roadside litter. Most estimates of the beverage fraction of litter range from 20 to 30 percent by item count and 40 to 70 percent by volume.[4,5]

While a concern for the growth in solid waste and litter is the most obvious reason to reduce the number of discarded containers, beverage container production has a significant impact on material and energy consumption as well. In 1973, 5 million tons of glass, 1.5 million tons of steel, and 400,000 tons of aluminum were consumed and thrown away in beverage containers.[6] The beverage container manufacturing process accounts for 1 to 2 percent of all energy used by all U.S. industries. Consumption of this material and energy is also accompanied by significant pollutant emissions to the atmosphere and natural waters and the generation of industrial solid wastes.

Until recently little had been done to come to grips with the litter, solid waste, and material and energy resource problems created by the production of beverage containers. However, legislation regulating the beverage container portion of waste has been implemented in the

---

*Deputy Director, Resource Recovery Division, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency.

[1] U.S. Environmental Protection Agency calculations based on data from Franklin, et al., Base line forecasts, p. 76, 88.

States of Oregon and Vermont. In these States deposits are required on all soft drink and malt beverage containers. Such deposits are refunded when the empty containers are returned to the retailer or distributor. The basic purpose of mandatory deposit legislation is to provide an incentive for the return of beverage containers for reuse or recycling. Similar legislation is being considered in many other States and communities across the nation. I would like to focus now on the effects of such legislation as studied by research organizations and EPA, and as determined by the actual experiences of Oregon and Vermont.

Mandatory deposit legislation is likely to result in significant decreases in the number of beverage containers discarded as litter. Data provided by the Oregon and Vermont State Highway Departments indicate approximately a 66 percent reduction in beverage container litter after passage of mandatory deposit legislation.

In terms of solid waste generation, if 90 percent of the containers bearing a deposit were returned, a decrease of 60 to 70 percent in the beverage container portion of solid waste would result. This would reduce waste generation 4 to 5 million tons per year nationally.

In terms of the conservation of energy, it is clear that the reuse and recycling of containers provides energy savings. Refillable glass bottles used 10 times consume less than one-third the energy in their manufacture and use than any one-way container now on the market. Aluminum cans that are recycled save 75 percent of the energy required to manufacture an aluminum can from virgin raw materials. Steel can recycling also results in a 30 percent energy reduction. If a mandatory deposit system resulted in a situation in which 80 percent of all beer and soft drinks were packaged in refillable bottles reused 10 times, with the remaining 20 percent packaged in cans which were returned and recycled at a 80 percent rate, there would be a reduction in the energy required to produce beverage containers of approximately 150 trillion BTU per year. This is the energy equivalent of 80,000 barrels of oil per day.

Of considerable importance in light of today's inflation is the issue of cost to the consumer. Beer and soft drinks sold in refillable containers are generally cheaper to the consumer than beverages in one-way bottles and cans. To the extent that mandatory deposit legislation induces a shift to refillable bottles, average prices of beer and soft drinks should decline.

Based on these data, we have concluded that enactment of national mandatory deposit legislation is highly desirable from a resource conservation, environmental, and cost point of view.

Turning now to the economic effects of mandatory deposit legislation. Experience in Oregon indicates a drop in the beer consumption growth rate from nearly 6 percent in previous years to 1.1 percent in 1973. However, beer sales increased by 5.7 percent from 1973 to 1974. Therefore, it is difficult to imply any long-term adverse sales impacts from the Oregon beverage container legislation.

In Vermont beer sales initially fell 10 percent in the year after enactment of the law. However, during this period there were also similar declines in the sales of other products and a significant reduction in tourism. Therefore, it is not clear that the beer sales reduction can be attributed to the legislation.

Soft drink sales in Oregon have been reported to be down 4 percent on a unit basis and unchanged on an ounce basis. However, in 1974, sugar price increases resulted in increased soft drink prices and thus adversely affected the sale trends of soft drinks both in Oregon and nationally. Therefore, the results from one transitional year are not sufficient to determine whether a permanent change in soft drink consumption has occurred as a result of passage of this legislation.

One major drawback of a mandatory deposit program is the potential for considerable temporary industrial disruption. A study performed by Research Triangle Institute estimated that in 1980, a deposit measure would have resulted in a loss of approximately 80,000 jobs nationally, primarily in the container manufacturing industries. However, there would have been created a roughly equal number of new jobs in the retail and distribution sectors of the economy. It is important to note, however, that the jobs gained would be lower paying than those lost. Thus, such a measure might produce a net loss in labor income. Time-phasing of such a measure can go a long way toward reducing these adverse impacts.

Mandatory deposit legislation is also likely to result in a decline in tax revenues during the period of transition to a refillable system. This would be due to the fact that a majority of beverage can lines would become obsolete, as would a large percentage of container-handling equipment. Under extreme conditions, the dollar cost of rapid changeover could be as high as $6 billion overall according to industry estimates. Estimates of losses in revenue from beer excise taxes and corporate write-offs for obsolete equipment during the first year of transition range from $371 million to $900 million nationally. These figures would probably be lower if beverage sales did not decline, and if beverage in cans continued to be sold or if legislation was phased in over time.

Mandatory deposit legislation may result in limitations in both brands of beverages and sizes of beverage containers available to the consumer. Preliminary data from Oregon support this indication as many foreign beers and some soft drink brands cannot be obtained in the same sizes in which they were available before the law went into effect.

Based upon the experience in the States which have enacted mandatory deposit laws, it is clear that a mandatory deposit program results in conservation of energy and materials and a reduction in solid waste and litter caused by beverage containers. Therefore, EPA has testified before the U.S. Congress in favor of adoption of nationwide mandatory deposit legislation.

However, associated with a sudden shift to refillable systems is the likelihood of some economic disruption and unemployment. Therefore, in order to achieve the resource and energy recovery benefits of a national mandatory deposit program while at the same time minimizing the adverse economic repercussions, we have recommended that such a system be implemented over an extended period of time and with proper controls.

Mandatory deposits for beverage containers have been studied fairly intensively and there is a reasonably reliable body of data concerning this issue. We also have the benefit of the Oregon and Vermont experiences. Based on all of this information, it should be clear that a requirement of mandatory deposits for beverage containers could make a significant contribution toward the solution of the environmental problems associated with no-deposit, no-return containers.

REFERENCES

1. Franklin, W. E., et al. [Midwest Research Institute]. Base line forecasts of resource recovery, 1972 to 1990. Washington, U.S. Environmental Protection Agency, Office of Solid Waste Management Programs, Resource Recovery Division, Mar. 1975. 376 p. (Unpublished report.)

2. Smith, F. A. Technical possibilities for solid waste reduction and resource recovery; prospects to 1990. Washington, U.S. Environmental Protection Agency, Office of Solid Waste Management Programs, Dec. 10, 1974. 19 p.

3. Applied Decision Systems, and Decision Making Information, Inc. Study of the effectiveness and impact of the Oregon minimum deposit law; project completion report. Salem, State of Oregon Department of Transportation, Highway Division, Oct. 1974. 3 v. (various pagings.)

4. Bingham, T. H., and P. F. Mulligan. [Research Triangle Institute]. The beverage container problem; analysis and recommendations. U.S. Environmental Protection Agency, Sept. 1972. 180 p. (Distributed by National Technical Information Service, Springfield, Va., as PB-213 341.)

5. Scheinman, T. Mandatory deposit legislation for beer and soft drink containers in Maryland; an economic analysis. Annapolis, State of Maryland, Council of Economic Advisors, Dec. 11, 1974. 20 p., app.

6. Loube, M. Beverage containers; the Vermont experience. Washington, U.S. Environmental Protection Agency, 1975. (In preparation.)

7. Hunt, R. G., et al., [Midwest Research Institute]. Resource and environmental profile analysis of nine beverage container alternatives; final report. v. 1-2. Environmental Protection Publication SW-91c. Washington, U.S. Environmental Protection Agency, 1974. 176 p.

8. U.S. Environmental Protection Agency calculations from data presented in References 1 and 7.

9. Impacts of beverage container regulations in Minnesota; a report to the Governor and the Minnesota Legislature. [Minneapolis], Minnesota State Planning Agency, Jan. 1974. 140 p.

10. Environmental Action. Press release, Oct. 17, 1974. 5 p.

11. Stern, C., et al. Impacts of beverage container legislation on Connecticut and a review of the experience in Oregon, Vermont and Washington State. Storrs, University of Connecticut, Department of Agricultural Economics, Mar. 20, 1975. 194 p.

12. Statement of J. Lucian Smith, President, Coca-Cola, U.S.A. In U.S. Congress, Senate, Committee on the Judiciary. Exclusive territorial allocation legislation. Hearings before the Subcommittee on Antitrust and Monopoly, 92d Cong., 2d sess., on S. 3040, S. 3116, S. 3133, S. 3148 and S. 2887. pt. 1. Aug. 9-10, Sept. 13 and 14, 1972. Washington, U.S. Government Printing Office, 1973. p. 181-194.

13. Waggoner, D. Oregon's bottle bill two years later. Portland, Columbia Group Press, May 1974. 57 p., app.

14. Donovan, R. A. Vermont skiing survey, 1973-74. Economic Research Report No. 74-5. [Montpelier], Agency of Development and Community Affairs, Research Planning Division, July 1974. 8 p.

15. R. S. Weinberg & Associates. Resource/energy recovery and recycling vs. source reduction: a simple economic analysis of two basic resource conservation strategies. Washington, U.S. Brewers Association, Inc., 1976. 17 p.

16. Quarles, J. R., Jr. Statement of Honorable John R. Quarles, Jr., Deputy Administrator, Environmental Protection Agency, before the Subcommittee on the Environment, Committee on Commerce, United States Senate, May 7, 1974. Cincinnati, U.S. Environmental Protection Agency, National Environmental Research Center, 1974. 14 p.

A LABOR VIEWPOINT

Robert McGlotten*

Unfortunately I did not have the opportunity to listen to the other participants on the dais, to participate and hear the arguments pro and con, their relationship to the whole thesis of this conference. I am going to be very, very brief but also address myself to the remarks of Mr. Ruvin and Mr. King.

First of all, just let me state that the AFL-CIO's position is very clear. Unfortunately I just ran from another meeting on the Hill, and I didn't have an opportunity to bring any of our policy resolutions with me. We're for solid waste legislation, resource recovery, that will not affect the jobs of our membership. We're very, very serious about this. We can ill afford at this stage of the game, whatever your persuasion may be, to have more folks unemployed. Many kinds of legislation, which you are espousing around the country, are saying to our workers, "You are no longer needed." We've got to fight unemployment; we can no longer stand the kind of situation which we have. We want to join you, work with you, to clean up litter, but we're not going to have our workers unemployed because you want to do away with a can or bottle. We just cannot afford it. We will not stand for it.

Mr. Ruvin made the statement that Oregon increased its number of jobs. I'm not really familiar with the results of the study. But I can guarantee you that any increase is in jobs with lesser skills, and that means lesser pay for our membership. We cannot stand that either. We have steel workers and aluminum workers making $6.00 an hour, and all of a sudden you're going to say to them that you're going to replace their jobs with bottle washer jobs at $2.00 an hour. We're not going to take it. We can't afford to.

In the same way that you relate to your constituents in terms of cleaning up the environment, we have to relate to our constituents in terms of what they buy every day. When you talk about the cost of the returnable, a gentleman made the statement that it's not really a direct cost, but it comes out of our members' pockets. When he's paying $1.40 for a six-pack and all of a sudden it goes up to $1.70, it comes out of his pocket, and I don't care whether he takes back the can or not.

In addition, let me remind you of one thing. I remember as a kid

---

*Legislative Representative, AFL-CIO.

I used to return bottles to the stores. Little bottles I got 2 cents for; big bottles I got a nickel for. It was very profitable for me to do that in the city of Philadelphia where I grew up; on my way back to school, I had a couple of pretzels to take back and maybe gave one to a little girlfriend. But you can't buy anything in the store any more for 2 cents or 5 cents. I'm not certain whether, if we did have deposits, that would really clean up the litter, with the way our society is growing and the new kind of life-style. Certainly bottles, paper, and cans are a problem that we have to deal with.

So, how do we deal with it? Not in terms of punitive legislation—because in your views you'll destroy another segment of society's livelihood—but in terms of something constructive. We are going hand in hand with the beverage industry and can industry to try to find a solution to it. All of our various affiliated unions are trying to do the same thing in a way which will not affect jobs but get to the objective that you want to get to. And that's to clean up the litter. We're willing to do that. And I think the St. Louis kind of experiment with the Union Electric Company is a very good experiment to start with: where they're burning one-fifth trash that's being recycled with four-fifths coal and using no oil at all.

Let's stop for a moment and talk about the real long-range plans that we have in labor. We look at anything that affects our membership; we think this makes very good sense because of one or two things. First of all, if we build the kind of recycling system that puts a market out there for people to buy recycled material, we're really doing something to help to create jobs. Second, if we're burning no oil, and we can burn that waste, then in 50 cities where we have this kind of facility we can save approximately 400,000 barrels of oil a day. This should be one of our primary goals when looking at the deficit as far as importing oil from the OPEC countries.

In addition, I may say that it's important for you to recognize that just banning the nonreturnable bottle is not going to be the solution to the waste problem. If you want to ban something, and you're talking about litter, why not ban paper? All of you know the EPA studies of the municipal waste stream. What do bottles and cans really make up? Eight percent of the total as opposed to paper and other kinds of rubbish. Are we going to have returnable pea cans, soup cans, other kinds of cans? Let's talk about really looking at the problem as it is. Yes, we have to do something about resource recovery. When we talk about source reduction, I think that's a little bit further down the road and that's a little bit more than a slogan. I think each of us, when dealing with our own constituents, must take a look ahead at the kinds of positions we take and how it affects the rest of the American people.

We just cannot sit idly by, those of us in industry, in labor, or those of you who have an interest in our society and environment. We would be against any kind of punitive legislation that will increase the amount of unemployment in our society. I don't have to give you the figures, but I just want to recite them to you so that you'll understand which way I am going.

In February and March unemployment was 5.5 percent, which meant 7.5 million people unemployed. The kinds of legislation that are proposed around this country, I would dare say, would bring it up another half a million people. Ladies and gentlemen, we don't need additional persons on the unemployment rolls. You have your thing, and you may say, "That's great," but that's your thing. Well, it's also going to be my thing because I care. I care about whether my brothers or sisters who work in steelmills and aluminum plants and glass plants are going to work tomorrow.

Yes, we can do something about the litter, but I think it's got to be done in a very constructive way where we look at everybody.

REGISTRATION LIST

[illegible] Alexander
League of Women Voters of Maine
[illegible] Street
Bath, Maine [illegible]

Gail Allison
League of Women Voters
1730 M Street, N.W.
Washington, D.C. 20036

Robert Anderson
Environmental Law Institute
Washington, D.C.

Shari Ames
American Can Company
Greenwich, Connecticut 06830

Norman H. Axelrod
Vice President, Public Affairs
McDonald's Corporation
Oak Brook, Illinois 60521

William O. Balgord
The Aluminum Association
750 Third Avenue
New York, New York 10017

Bob Barrickman
International City Management Association
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036

S. Bauer
Gordian Associates Inc.
30 Rockefeller Plaza
New York, New York 10020

Mary E. Beer
[illegible] N.W. [illegible] Street, Route 2
Ridgefield, Washington 98642

Lawrence E. Becker
Institute of Scrap Iron & Steel, Inc.
1729 H Street, N.W.
Washington, D.C. 20006

William S. Behn
FMC Corporation
Suite 500, 1627 K Street, N.W.
Washington, D.C. 20006

Robert E. Bellinger
The Procter and Gamble Company
Ivorydale Technical Center
5299 Spring Grove Avenue
Cincinnati, Ohio 45217

James M. Bennett
Joseph Schlitz Brewing Company
235 West Galena Street
Milwaukee, Wisconsin 53201

Frederick E. Bernstein
[illegible] Street
Sherman Oaks, California 91403

Leslie R. Bingham
Research Triangle Institute
P.O. Box 12194
Research Triangle Park, North Carolina
27709

Marc Blakeslee
Air and Water Management
Environmental Protection Agency
Washington, D.C. 20460

Thomas Blessing
Ecology Center of Ann Arbor
417 Detroit Street
Ann Arbor, Michigan 48104

Ethel Bobrich
West Michigan Regional Plan Commission
[illegible]
Grand Rapids, Michigan 49502

Gilbert E. Bourcier
Reynolds Metals Company
6601 West Broad Street
Richmond, Virginia 23261

Ann Branston
International City Management Association
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036

Timothy J. Bratton
Pennsylvania Department of Environmental
Resources
P.O. Box 2063
Harrisburg, Pennsylvania 17120

William H. Bree
Oregon State Department of Environmental
Quality
1234 S.W. Morrison Street
Portland, Oregon 97205

Harry Butler
Office of Solid Waste Management
Programs
Environmental Protection Agency
Washington, D.C. 20460

Thomas R. Canfield
Office of Solid Waste Management
Programs
Environmental Protection Agency
Washington, D.C. 20460

Christine M. Carlson
League of Women Voters of Ohio
1445 Meadow Lane
Yellow Springs, Ohio 45387

Jane M. Carmichael
League of Women Voters of Vermont
90 Brigham Road
Essex Junction, Vermont 05452

John Casler
Kaiser Aluminum & Chemical Corporation
300 Lakeside Drive
Oakland, California 94643

Mrs. Robert F. Conklin
League of Women Voters of Arlington
3117 North 21st Street
Arlington, Virginia 22201

George M. Conley
Aluminum Company of America (ALCOA)
1200 Ring Building
Washington, D.C. 20036

Joan E. Cook
League of Women Voters of Oregon
2837 Longview Avenue
Eugene, Oregon 97403

J. Wendy Cook
Government of Ontario
Waste Management Advisory Board
Queens Park, Toronto M7A 1A7
Ontario, Canada

Jack L. Cooper
National Canners Association
1133 20th Street, N.W.
Washington, D.C. 20036

Mrs. Linda Craig
League of Women Voters of California
30 [illegible] Way
Menlo Park, California 94025

[illegible]
U.S. Senate Committee on Public Works
Dirksen Senate Office Building
Washington, D.C. 20510

Russell E. Cummings
Leonard S. Wegman Co., Inc.
101 Park Avenue
New York, New York 10017

Lloyd Curtis
Pepsico, Inc.
Anderson Hill Road
Purchase, New York 10577

Anne E. Donnelly
D.C. City Council
District Building
Washington, D.C. 20004

Louis E. [illegible]
Principal Planner
Department of Administration, Statewide
Planning Program
265 Melrose Street
Providence, Rhode Island 02907

Victor A. [illegible]
Amoco Chemicals Corporation
200 E. Randolph M.C. [illegible]
P.O. Box [illegible]
Chicago, Illinois 60680

James W. [illegible]
(Science Teacher)
740 Lilburn Drive, N.W.
Concord, North Carolina

Walter H. [illegible], Jr.
Dewey & Almy Chemical Division
W.R. Grace & Company
Woodbury, New Jersey [illegible]

Dennis R. Downs
Utah State Division of Health
[illegible] East [illegible] South [illegible]
Salt Lake City, Utah [illegible]

William V. Driscoll
Tissue Division, American Paper Institute
260 Madison Avenue
New York, New York 10016

R.E. Duffy
The Carborundum Company
[illegible] 17th Street, N.W.
Washington, D.C. [illegible]

John J. Dunn, Jr.
Montgomery County Environmental Protection Solid Waste Management
6110 Executive Boulevard, Room [illegible]
Rockville, Maryland 20852

John Dzikowicz
U.S. Jaycees
[illegible] Fairmount Road
Morganville, New Jersey

A. Blakeman Early
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

C. Stanley Edgar
International Paper Company
220 E. 42nd Street
New York, New York 10017

J. Rodney Edwards
American Paper Institute
260 Madison Avenue
New York, New York 10016

Charles W. Felix
Single Service Institute, Inc.
250 Park Avenue
New York, New York 10017

Mrs. Diana B. Fetterman
Materials Di[illegible]
Bureau of Do[illegible] Commerce
U.S. Departm[illegible] of Commerce
Washington, D.C. 20230

Richard Fry
U.S. Jaycees
306 Harristown Road
Glen Rock, New Jersey

Richard W. Garbutt
918 16th Street, N.W., Suite 501
Washington, D.C. 20006

Chester E. Gardner
United States Brewers Association, Inc.
1750 K Street, N.W.
Washington, D.C. 20006

Linda Gelbard
McDonald's Corporation
Oak Brook, Illinois 60521

Neil Gerlach
Center for Environmental Quality Management
Hollister Hall
Cornell University
Ithaca, New York 14850

Thomas H. Gillard, Engineer
Waste Management Section, Hazardous Materials Branch
U.S. Environmental Protection Agency Region VII
1735 Baltimore
Kansas City, Missouri 64108

Charles N. Goddard
State Department of Environmental Conservation
Division of Solid Waste Management
50 Wolf Road
Albany, New York 12233

Rosalie Green
National Solid Wastes Management Association
1145 Rhode Island Avenue, N.W., Suite 800
Washington, D.C. 20036

Michael J. Greene
Council of State Governments
Iron Works Pike
Lexington, Kentucky 40511

Betty Greer
Citizens for a Better Environment
[illegible] Street, N.W., Suite 700
Washington, D.C. [illegible]

Clyde E. Griffith, Counsel
National Restaurant Association
1155 15th Street, N.W., Suite 507
Washington, D.C. 20005

Jim [illegible]
Mead Packaging
P.O. Box [illegible]
Atlanta, Georgia [illegible]

Ashok Gupta
Environmental Action
1346 Connecticut Avenue, N.W., Suite 731
Washington, D.C. 20036

John E. Haaland
The Pillsbury Company
608 Second Avenue S.
Minneapolis, Minnesota 55402

Edwin A. Hafner
Hafner Industries, Inc.
Box [illegible] Amity Station
New Haven, Connecticut [illegible]

Thomas B. Hagler
Aluminum Company of America
1536 Alcoa Building
Pittsburgh, Pennsylvania 15219

Penelope Hansen
Office of Solid Waste Management
  Programs
Environmental Protection Agency
Washington, D.C. 20460

Allen B. Harris
Assistant Attorney General State of
  Oklahoma
2335 N.W. 15th Street
Oklahoma City, Oklahoma [illegible]

Dennis E. Hawkins
Office of Solid Waste Management
  Programs
Environmental Protection Agency
Washington, D.C. 20460

Mrs. Lucinda Headrick
League of Women Voters of Texas
3808 Walnut
Irving, Texas 75060

J.D. Heaman
Government of Ontario
[illegible]
Toronto, Canada [illegible]

Dr. Karl E. Henion II
University of Texas at Austin
BEB 200 Graduate School of Business
University of Texas
Austin, Texas

J. E. [illegible]
[illegible] Corporation, Suite [illegible]
1025 Connecticut Avenue, N.W.
Washington, D.C. 20036

William D. Holland
Division of Solid Waste
Department for Natural Resources and
  Environmental Protection
Frankfort, Kentucky 40601

Lawrence A. Holley
Director of Research and Education
Aluminum Workers International Union
818 Olive Street, Suite 338
St. Louis, Missouri 63101

Eileen [illegible]
Solid Waste Chairman, D.C. League of
  Women Voters
[illegible] Albemarle Street, N.W.
Washington, D.C. 20016

Mrs. Edward Johnson
209 Maple Avenue
Wilmette, Illinois 60091

Barbara Kandarian
League of Women Voters
[illegible] Court
Rochester, Michigan [illegible]

[illegible] Keene
[illegible] Albemarle Street, N.W.
Washington, D.C. 20016

John E. [illegible]
American Can Company
American Lane
Greenwich, Connecticut 06830

Gary D. Knight
U.S. Chamber of Commerce
1615 H Street, N.W.
Washington, D.C. 20062

Ellen Knox
Ohio Chapter, Sierra Club
3131 Huntington Road
Shaker Heights, Ohio 44120

Morris N. [illegible], Executive Director
Environmental Action Coalition
235 East 42 Street
New York, New York 10017

Nancy Riordan, President
Earth Alive, Inc.
[illegible] Fiddlers Green
Farmington, Michigan [illegible]

Edward [illegible]
American Can Company
1800 K Street, N.W., [illegible]
Washington, D.C. 20006

Ernest J. LaBaff, Vice President
Aluminum Workers International Union
818 Olive Street, Suite [illegible]
St. Louis, Missouri 63101

William A. Largent
Essex Fibre Company
100 Summit Avenue
Montclair, New Jersey 07043

Russell L. LaVine, City Councilman
City of Des Moines
East 1st and Locust Street
Des Moines, Iowa 50307

Richard J. Leary
Continental Can Company, Inc.
633 Third Avenue
New York, New York 10017

Bon Sing Lee
Research Triangle Institute
P.O. Box 12194
Research Triangle Park, North Carolina 27709

Earl Leonard
Coca-Cola
Atlanta, Georgia

Richard P. Leonard
Calspan Corporation
Box 235
Buffalo, New York 14221

Muriel Lightfoot
League of Women Voters of Connecticut
17 [illegible] Road
Westport, Connecticut

Carl Lindstrom
Environmental Specialist
Office of the Scientific Attache, Swedish Embassy
600 New Hampshire Avenue, N.W.
Washington, D.C. 20037

Stephen A. Lingle
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

[illegible] Brian Liss
Department of Engineering
[illegible] Broad Street, City [illegible] Room [illegible]
Newark, New Jersey 07102

Michael Loube
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

Patrick J. Lynch
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

Alan R. Magrini
Indiana State Board of Health
1330 W. Michigan Street
Indianapolis, Indiana 46207

W. P. Mahoney
Ball Corporation
1509 S. Macedonia
Muncie, Indiana 47302

Louis J. Mancini, Jr.
Department of Urban and Policy Sciences
State University of New York at Stony Brook
Stony Brook, New York 11790

Anna M. Martin, Division of Solid Waste
Department for Natural Resources and Environmental Protection
Frankfort, Kentucky 40601

David F. Martin
National Soft Drink Association
1128 16th Street, N.W.
Washington, D.C. 20036

Joseph J. McCann, Jr.
Essex Fibre Company
100 Summit Avenue
Montclair, New Jersey 07043

Andrew McCutcheon
Reynolds Metals Company
P.O. Box 27003
Richmond, Virginia 23261

Grant J. Merritt
Minnesota Pollution Control Agency
1935 W. County Road B-2
Roseville, Minnesota 55113

Edward J. Miles
Anheuser-Busch, Inc.
721 Pestalozzi Street
St. Louis, Missouri 63118

Harry L. Moody
Glass Bottle Blowers Association
226 S. 16
Philadelphia, Pennsylvania 19102

Barbara Moulton
Consumer Product Safety Commission
Bureau of Economic Analysis
Washington, D.C.

John Murphy, Vice President
Aluminum Workers International Union
818 Olive Street, Suite 338
St. Louis, Missouri 63101

Ralph A. Nichols
ALCOA
1501 ALCOA Building
Pittsburgh, Pennsylvania 15219

Charlene Nimmo
Florida League of Women Voters
[illegible] Boulevard
Pensacola, Florida 32504

Dr. M. S. Noble
E. I. duPont de Nemours & Company
1007 Market Street
Wilmington, Delaware 19898

Joseph A. Orlando
Mathematica, Inc.
1801 Market Street
Philadelphia, Pennsylvania 19103

John Osborn
Office of Technology Assessment
U. S. Congress
Washington, D.C.

Dr. W. A. Patterson
W. R. Grace & Company
P.O. Box 464
Duncan, South Carolina 29334

William Pauls
Miami Valley Regional Planning
Commission
333 W. First Street
Dayton, Ohio

Rosalie Petrard
Pennsylvania League of Women Voters
313 Lafayette Avenue
Swarthmore, Pennsylvania 19081

Charles Peterson
Office of Solid Waste Management
Programs
Environmental Protection Agency
Washington, D.C. 20460

Mrs. Edith Post
Concern, Inc.
2233 Wisconsin Avenue, N.W.
Washington, D.C. 20007

Marian Preis
501 E. Lincoln Street
Waupun, Wisconsin 53963

Roger W. Powers, President
Keep America Beautiful, Inc.
99 Park Avenue
New York, New York 10016

Donald F. Prescott
Director of Public Relations
National Soft Drink Association
1101 16th Street, N.W.
Washington, D.C. 20036

Theodore H. Puckorius
Lester B. Knight & Associates, Inc.
Suite 1000
2011 L'Enfant Plaza E., S.W.
Washington, D.C. 20024

Daniel Rapp
J. C. Penney Company
1156 15th Street, N.W.
Washington, D.C. 20005

Larry Ratliff
Henry J. Kaufman & Associates, Inc.
1419 21st Street, N.W.
Washington, D.C. 20037

Harvey Reder
Can Manufacturers Institute, Inc.
1625 Massachusetts Avenue, N.W.
Washington, D.C.

Austin E. Rhoads
International Association of Ice Cream
  Manufacturers
910 17th Street, N.W., 11th Floor
Washington, D.C. 20006

Henry Ritter, Vice President, New York
  Marketing
Avco Aerostructures Division
P.O. Box 210
Nashville, Tennessee 37202

Duane L. Robertson
Solid Waste Management Bureau
Environmental Sciences Division
Montana Department of Health and
  Environmental Sciences
1424 9th Avenue
Helena, Montana 59601

Thomas L. Roller
Iowa Department of Environmental Quality
P.O. Box 3326
3920 Delaware Avenue
Des Moines, Iowa 50316

Margery H. Romberger
League of Women Voters, National Capital
  Area
[illegible] Forest Hill Drive
Silver Spring, Maryland 20901

C. R. Russell
International Paper Company
220 East 42nd Street
New York, New York 10017

Judy Ruskin
League of Women Voters of North Carolina
[illegible] Street
Cary, North Carolina 27511

Harold Sexton
Office of Solid Waste Management
  Programs
Environmental Protection Agency
Washington, D.C. 20460

Edward A. Sarger
Grumman Ecosystems Corporation
1111 Stewart Avenue
Bethpage, New York 11714

Marvin Schlackman
EPA, Region IX
100 California Street
San Francisco, California 94111

Robert L. Schulz
The Fourth Sink Management Group, Inc.
P.O. Box [illegible]
[illegible], New York [illegible]

Mrs. William E. Shade
Chairman, Housewives to End Pollution
[illegible] West Lane
Eden, New York 14057

Alan Shilepsky
Office of Solid Waste Management
  Programs
Environmental Protection Agency
Washington, D.C. 20460

Mack R. Sharpe
Texas State Department of Health
1100 W. 49th Street
Austin, Texas 78756

J. Thomas Stiles
Government Research Corporation
1730 M Street, N.W.
Washington, D.C. 20036

Mrs. Emily Smith
League of Women Voters of Illinois
[illegible] S. Merrill Avenue
Chicago, Illinois 60649

John R. Snell, President
John R. Snell Engineers, Inc.
221 West Saginaw
Lansing, Michigan 48933

James E. Stacey, Jr.
Department of City Planning
Room 508, City Hall Building
Norfolk, Virginia 23510

Patricia H. Stein
League of Women Voters of Minnesota
[illegible] Avenue South
Minneapolis, Minnesota [illegible]

Mrs. [illegible] Strand
League of Women Voters of Wisconsin
[illegible] La Plant Street
Green Bay, Wisconsin [illegible]

Robert W. Swanson
Coordinator of Solid Waste Management
  Affairs
Sierra Club, Pacific Northwest Chapter
[illegible] University Way, N.E.
Seattle, Washington [illegible]

Barbara M. Sager
N.Y. State League of Women Voters
Box [illegible]
[illegible], New York [illegible]

Morris E. [illegible]
Operations Staff Coordinator
[illegible] International
[illegible] Colonial Plaza
Youngstown, Ohio [illegible]

J. M. Thomas
DOW Chemical U.S.A.
2030 Dow Center
Midland, Michigan

Bruce R. Thompson
Joseph Schlitz Brewing Company
235 West Galena St.
Milwaukee, Wisconsin [illegible]

Robert Tomelli
P.O. Box 319
Hiram, Ohio [illegible]

Sue Tuttle
Environmental Action
1346 Connecticut Avenue, N.W., Suite 731
Washington, D.C. 20036

James P. Turner
Manufacturing Chemists Association
1825 Connecticut Avenue, N.W.
Washington, D.C. 20009

J. Ross Vincent
Ecology Center of Louisiana, Inc.
P.O. Box [illegible]
New Orleans, Louisiana [illegible]

Diana R. Wahl
National League of Cities-U.S. Conference
of Mayors
1620 Eye Street, N.W.
Washington, D.C. 20006

Daniel J. Walsh
The Aluminum Association
750 Third Avenue
New York, New York 10017

Beverly R. Warburton
Colorado League of Women Voters
[illegible]
Boulder, Colorado [illegible]

Donald W. Webster
Vermont Agency of Environmental
Conservation
5 Court Street
Montpelier, Vermont 05602

Karen A. Wendt
Minnesota Pollution Control
1935 W. Co. Rd. B-2
St. Paul, Minnesota [illegible]

J. H. Wharton Jr.
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166

Richard J. Wiechmann
American Paper Institute
260 Madison Avenue
New York, New York 10016

Timothy M. Wilkinson
Aluminum Company of America
1501 Alcoa Building
Pittsburgh, Pennsylvania [illegible]

Owen D. Wilson
National Wildlife Federation
1412 16th Street, N.W.
Washington, D.C. 20036

W. D. [illegible]
Government of Ontario
Waste Management Advisory Board
Queens Park, Toronto [illegible]
Ontario, Canada

(continued)